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Mexico: An Evaluation of the Main Features of the Tax System

Jorge Martinez-Vazquez[*]

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Summary and Overview

Mexico's tax system is a paradox. The tax policy and tax administration reforms of the late 1980s and early 1990s delivered a tax structure that is in many ways comparable, if not superior, to that in many OECD countries. However, Mexico's tax system continues to perform in some fundamental ways, in particular in its ability to raise adequate revenues, worse than the tax system of many developing countries. The basic objective of this evaluation is to try to explain this paradox. In doing that we will compare the revenue performance of Mexico's tax system to that of other developing and developed countries and examine Mexico's tax system buoyancy and elasticity over time. The evaluation will also take stock of the recent performance of Mexico's tax system vis-a-vis other important objectives of any tax system. In particular, we will examine the vertical and horizontal distribution of tax burdens, the relative distortions or excess burdens introduced by the tax system in the decisions of economic agents, and its relative complexity and impact on tax administration and taxpayer compliance costs. The main objective of the evaluation is to identify the most important avenues for reform in tax policy, tax administration, and the political economy of tax reform in Mexico.

The improvements in Mexico's tax structure have been many during the last 10 to 15 years. Examples in the area of income taxation include the practically full indexation of personal and enterprise profit tax for inflation, the full integration of these two taxes to avoid the double taxation of dividends, and the application of a minimum tax on gross assets, to which the enterprise profit tax is creditable, to combat tax evasion. The structures of the VAT and excise taxes are also on the whole quite adequate. While many nuisance taxes were eliminated, the standard tax rates for the main taxes are similar to or slightly below international averages. The effective marginal rates of taxation on new investment, as also reviewed below, have been found to be below those of most OECD and Latin American countries, thus creating a favorable atmosphere for domestic and foreign investment.

And yet, with all these good characteristics, Mexico's tax system has not been able to generate much more that 10 to 11 percent of tax revenues in relation to GDP. The most important issue before proceeding with tax reform, especially if the most important objective is to increase the revenue adequacy of the system, is to explain what factors may account for this enduring low tax effort.

Three sets of factors or hypotheses may account for the lackluster revenue performance of Mexico's tax system. Each of these three hypotheses are explored at length in the report but are summarized here. It needs to be understood that these three hypotheses are not exclusive. Instead, there are sufficient grounds to suspect that all three have been at play with varying degrees of importance in the history of Mexico's tax system for the last 20 years.

The ***first hypothesis*** is that the good fundamental structure of the tax system, and therefore its revenue capacity, economic neutrality, and fiscal equity, has been

undermined by isolated ad hoc policy measures. Several examples are conspicuous. In the case of the personal income tax, the quite normal difficulty of taxing employee fringe benefits at the personal level led tax policy makers in Mexico to exempt fringe benefits and to create a complex system of credits and actual subventions (negative taxes or transfers) to compensate employees who may lack fringe benefits in their employer's compensation packages. The use of this compensatory system in turn has created notches with extremely high marginal tax rates for taxpayers, which contributes to the level of evasion. Probably, the only way to dismantle this complex and costly (revenue wise) system is to leave fringe benefits exempt at the individual level but disallow them as deductions at the enterprise level and eliminate the compensatory credits and subventions. Under the personal income tax too, capital gains from the sale of securities whose earning have not been previously taxed have been declared exempt.

In the case of the tax on enterprise profits, several economic sectors, including all agriculture and transport, benefit from a special regime where the tax base is calculated on a cash-flow basis. Agriculture, other primary sectors, and publishing also benefit from a special regime with a tax rate that is half of that applied under the general corporate income tax regime. A simplified small taxpayer regime based on the taxation of gross income is also too generous because it applies to businesses with gross annual incomes under $220,000.

In the case of the VAT, Mexico zero rates (rather than exempting) a wide list of domestic goods and services, which include agricultural goods, foodstuffs, and medicines. In addition, the equipment used in agriculture is also zero-rated.

All these special departures for the general regimes not only have cost revenues and reduced the elasticity of tax revenues in relation to GDP, but also have undermined the confidence of taxpayers in the fairness of the system by creating significant horizontal fiscal disparities. The departures have also added excess burden losses by further distorting investment choices.

The ***second hypothesis*** is that tax administration has faltered either because tax policy measures have ignored the ability of the current tax administration to enforce complex tax issues or because the tax administration service has simply failed to modernize and, indeed, may have gone backwards in some of the institutional improvements achieved during the mid1980s.

There are also a few conspicuous examples showing how the Mexican authorities have put the "cart of tax policy" before the "horse of tax administration." The most important of these examples is the liberal use of consolidation rules for dependent enterprises. It is widely acknowledged that in Mexico only a few tax accountants in the private sector have the skills to follow the complex current rules and that there is no one in the tax administration qualified to challenge or audit many of the consolidated tax returns. This in effect means that tax compliance in the consolidation cases truly becomes voluntary and that tax policy makers unwittingly wrote a blank check to a powerful group

of taxpayers (about 350 consolidated groups involving 5,000 separate companies). Another example where tax policy has unnecessarily complicated the task of the tax administration is in the use of a value-added system up to the wholesale level for collecting many of the excise taxes. This more sophisticated approach to excise collections is not used even in most countries with much more advanced tax administrations than Mexico's. Collecting excise taxes at a single stage at the factory and import levels has proven to be more effective in most other countries. These examples illustrate well the general principle that it may be necessary to adapt tax policy principles to the current capabilities of Mexico's tax administration, or else to improve significantly the capabilities of the tax administration.

On the pure administration side, it is clear by the persistent high levels of tax evasion that Mexico's tax administration system is not capable of enforcing the current tax system at an acceptable level. The focused efforts to improve the efficiency of the tax administration system in the late 1980s were not sustained during the 1990s. The Mexican Government is currently at an impasse regarding which is the most appropriate model to adopt in order to pursue the modernization and strengthening of its tax administration (the SAT).

The ***third hypothesis*** is that the Mexican authorities have pursued a policy, at times implicit but more often explicit, of keeping tax effort (the ratio of revenues to GDP) in the country at a relatively constant level. This goal of the constancy of tax effort has been achieved via two types of reactions. First, any increases in revenues from an elastic response of the tax structure to economic growth, enlargement of the tax bases, or increased revenues from petroleum was followed by discretionary tax policy measures such as lowering tax rates or granting special regimes in order to keep actual tax effort more or less constant. Second, the other response to changes in the actual ratio of revenues to GDP was followed by the relaxation or tightening of tax administration effort.

Of the two venues, discretionary changes in tax policy appear to have been more common or frequently used. As discussed further below, there is, at least during the decade of the 1980s, a reverse or mirror image of revenues from petroleum and non-petroleum sources. There is also a close parallel in the chronology of tax concessions with periods in which the automatic elasticity of the system may have produced an increase in revenue effort. This parallelism is also acknowledged by the tax authorities themselves, past and present. It has been a common, although not explicitly stated, policy within the Ministry of Finance during much of the last two decades that any increase in revenues should be spent by the Ministry itself in the form of rate reductions of tax expenditures rather than on the expenditure side of the budget by line ministries and other budget units. To a large degree, the goal of keeping tax effort constant was a significant result of the "negotiated" tax burdens agreed upon by the government authorities and the representatives of the private sector. The political economy of taxation in Mexico has involved periodic discussions and agreements between, on the one side, a willingly compliant compact of large taxpayers (with and without the state petroleum monopoly,

PEMEX) and, on the other side, the government authorities agreeing to compromise on the overall level of tax effort. The use of the second venue for adjustment, changes in the level of enforcement or effort by the tax administration, has been more likely asymmetric: it has not been so much that tax enforcement efforts were relaxed when government revenues were up, but more that high concentrated levels of enforcement were launched (in the from of "tax crusades" and so on) only when government revenues were dramatically down due to economic crises and business cycle downturns.

If this third hypothesis contains a kernel of truth, then it is full of implications regarding whether or not it is desirable to permanently increase the Mexico's level of tax effort in the next round of reforms. The most important implication is that there needs to be an explicit agreement among the government and the private sector on the need and level of the higher tax effort. A second implication is that the Ministry of Finance will need to refrain from further changes in tax policy after the tax reform package is introduced. The Ministry of Finance needs to eradicate the notion that it holds the right to "spend" on the revenue side of the budget any automatic increases in tax effort. A third implication is that the overall management of the tax administration should be detached from political pressures to fine tune the actual level of tax enforcement to the economic or political cycles. Other than providing its annual budget, the federal government authorities should leave the tax administration alone to execute a sustained optimal level of tax enforcement that is allowed by its budget.

Last, one needs to ask why it is that Mexico's private sector has insisted on, and the government has agreed to, maintaining tax effort in the country at its relative constant and low levels. Two reasons that are commonly cited, and which would need to be addressed to gain a national consensus on increasing government revenues as a share of GDP, are the lack of confidence among taxpayers that current tax revenues are well spent and the perception that not everyone is paying his fair share because of widespread evasion and the inability of the tax authorities to enforce the current laws. Measures to increase public expenditure efficiency and to control tax evasion are two programs that need to accompany any plan to reform the tax system.

The rest of this report evaluates the performance of Mexico's tax system over the last two decades in several important areas including, revenue adequacy, structure, temporal elasticity, stability and behavior over the business cycle, efficiency, and equity. This evaluation provides a test for the validity and relative importance of the three hypotheses stated above. We close by sketching the feasibility, content, and potential revenue impact of a tax reform that would address the most important problems identified in the evaluation.

Revenue Adequacy and International Comparisons

One measure of fiscal adequacy in any country is whether sufficient revenues are generated to meet the desired level of expenditures. Failing to generate a sufficient

amount of revenues can be attributed to either an unrealistic level of expenditures or inadequate revenue performance. Numerous previous studies have noted that, if anything, the level of public expenditure in Mexico is too low for the physical infrastructure and human capital needs of the country. Given this consensus, one of Mexico's tax system's most important problems is its inability to yield adequate revenues to finance basic public sector goods and services.[1]

Over time, the ability of Mexico's tax system to raise revenues has not changed much and perhaps it has deteriorated more recently. Tax revenues for the general government[2] as percent of GDP, one of the most common measures of revenue performance, remained in 1998-99 at slightly below the levels of 1980-81, in the neighborhood of 17 percent (Table 1). Although general government revenues as percent of GDP have moved up and down, over the last two decades they have remained relatively stable overall, averaging 18.82 percent. Discounting the effect of privatization revenues in 1991, 1992, and 1994[3], general government revenues appear to have grown generally at the same pace as the economy over time. The narrower measures of total federal revenues (which exclude social security funds and subnational governments) and federal tax revenues (which exclude oil and other non-tax revenues) as percent of GDP exhibited similar patterns as general government revenues over the last two decades. For example, federal tax revenues averaged 10.67 of GDP and stood in 1999 at 11.21 percent, just a bit higher than 1980, at 10.91 percent. Subnational government own-source revenues, for the years data are available, averaged 1 percent of GDP, with tax revenues averaging only 0.37 percent of GDP (Table1). The overall adequacy of revenues can be further investigated using two very different approaches. The first approach involves relevant international comparisons. The second approach examines the overall behavior of the government budget deficit.

International Comparisons:

One way to approach the question of revenue adequacy in Mexico is to ask whether the country's tax effort is "in line" with other countries of the same level of

[1] It should be clear that this statement does not represent any normative judgment of the fiscal performance of Mexico. There is no absolute scale against which one can assess how good or bad a country's relative size of the public sector is. The share of government in GDP reflects, among other things, the collective preferences of a country for public goods and services vis-a-vis private consumption. Clearly, from an economic standpoint, these preferences cannot be judged right or wrong. It is rather a positive statement that is being made here: that the current level of revenues is not adequate to support all the expenditure programs that are desired.

[2] General government revenues consist of central government revenues, revenues from social security and extra budgetary funds (if applicable), and the own-source revenues of subnational governments. Using general government revenues, as opposed, for example, to central government revenues, is desirable because it provides a more balanced perspective since countries differ in their level of fiscal decentralization and the consolidation of social security and other extra-budgetary funds in the central government budget.

[3] See "Non-tax revenues: Others" in Table 1.

development and general economic characteristics. Although it is clear that there is no ultimate way to establish how high taxes should be in a country, the comparison with international practice allows us to know how far Mexico may be below (or above) the "international norm." If the level of tax effort in Mexico is too low with respect to the international norm this would be an indication that less than the adequate level of public services is being provided and that the level of public infrastructure is less than that required for the country's development. Comparing Mexico's tax effort with that of other countries with similar levels of development also provides a lead on how much tax effort can increase in Mexico without getting out of line with potentially competitor countries for foreign direct investment.

For 1997, the most recent year for which cross-country data are available, Mexico lagged behind other comparable countries in Latin American, whether tax effort is measured as general government revenues as percent of GDP or only general government tax revenues as percent of GDP (Table 2). In particular, Mexico's tax effort is below that of countries such as Argentina, Brazil, Chile, and Costa Rica. With respect to OECD countries, Mexico falls further behind applying a level of tax effort that is 15 percent of GDP lower than the average OECD country. By comparison to its NAFTA partners, Mexico exercises less than half the tax effort of Canada and a little over half the tax effort of the United States (Table 2).

However, simply making comparisons of the ratio of tax revenues to GDP across countries may be misleading because the ability to collect taxes across countries may differ due to the availability of tax handles and, in particular, because the overall level of development may also differ. Therefore, it is useful to make international comparisons on tax effort attempting to control for these differences in ability to collect taxes. To this end, we use regression analysis to estimate the average capacity to collect taxes for a sample of countries, controlling for GDP per capita and other proxies for the ability to collect taxes. These regressions are then used to predict the level of tax effort that on average would be exerted given the per capita income and other characteristics of any given country.

More specifically, in the regression analysis approach, the dependent variable is taxable capacity as measured by the ratio of tax collections to GDP. We regress this measure of taxable capacity on a variety of proxies for the tax bases, which are the independent variables in the regression analysis. From each estimated equation, a predicted value of the tax collection to GDP ratio is obtained, that is, the amount the country could collect if it exerted an "average" tax effort. The effective level of tax effort is then defined as the ratio of actual to predicted tax effort. By calculating the ratio of actual to predicted tax collections, we can derive a cleaner measure of tax effort since we are controlling for the impact of changes in the general tax base over time.

There are many different specifications that can be used in estimating tax effort across countries. Here we use three different models that have often been used in the past

in this kind of analysis.[4] Each of the models allows us to derive an index for ranking countries according to their effective level of effort. These models are

Model 1: $T = a + b\,Y + c\,Xm$

Model 2: $T = a + b\,Mine + c\,Ag$

Model 3: $T = a + b\mathrm{Y} + c\,Xm + d\,Ag,$

where,

T	=	ratio of tax collections to GDP
Y	=	per capita GDP
Xm	=	ratio of the sum of exports plus imports to GDP
Mine	=	share of mineral and fuel exports in GDP
Ag	=	share of agriculture in GDP

As indicated above, the independent variables attempt to capture the effects of differences in overall economic structure on the ability to raise taxes. In particular, a higher level of per capita GDP proxies a generally greater ability to collect taxes. Similarly, a larger external sector (imports plus exports) and a larger share of mineral and fuel exports in GDP also proxy a greater ability to collect taxes. On the other hand, the larger the share of the agricultural sector in GDP, the lower the ability to collect taxes. The data used for the estimation are from the International Monetary Fund's *Government Finance Statistics Yearbook* (1999) and the World Bank's *World Development Indicators* (2000). The models are estimated for a sample of 32 developing countries from 1990 through 1996. By estimating tax effort over time, we are less likely to draw inferences based on the impact of conditions in a single year. The results in Table 3 show that regardless of the model specified, Mexico ranks consistently among the bottom third of countries in the sample in terms of the level of tax effort. According to the three models, Mexico's tax effort is 82 percent, 63 percent, and 70 percent of the international average.[5] Based on these estimates, a "normal" tax effort (tax collections as percent of GDP) for Mexico during this period would have been between 12.75 and 16.75 percent of GDP as opposed to the actual 10.5 percent.

Tax Effort and the Budget Deficit:

An alternative approach to assessing Mexico's tax effort is to examine the level and persistence of the budget deficit. The basic premise in this approach is that a budget deficit that is high and persistent could be taken as valid evidence that tax effort is too low for the expenditure needs of the country.

[4] See, for example, Bahl et al.(1996).

[5] Note that this international average is exclusively based on the countries included in the sample (in Table 1.8). The sample does not contain any high-income countries.

The actual budget deficit in Mexico exhibited very different profiles during the 1980s and 1990s. In the first decade, budget deficits over 10 percent of GDP were common. During the 1990s, however, the budget deficit never exceeded 4 percent of GDP and quite often was maintained under 1 percent of GDP.

Clearly, the sustained deficits during the 1980s could have been interpreted as an indication that Mexico's level of tax effort was too low to cover the level of expenditures desired by the government. The budget imbalance during the 1980s was very pronounced. Note that closing a deficit of 10 percent of GDP would have required practically doubling the existing level of tax effort. But clearly the same conclusion does not apply to the 1990s. During this decade, the level of tax effort appears to have reflected better the desired level of government expenditures. Actually, the very small budget deficits since 1993 could indicate that Mexico has reached some sort of equilibrium vis-a-vis its desired level of tax effort. However, this conclusion is subject to a general caveat. The absence of deficits only means with certainty that fiscal discipline has been enforced within available resources. It is still possible that the government may desire to increase its level of expenditures and that will call for a higher tax effort if fiscal discipline is to be maintained.

In summary, this section has shown that Mexico's overall level of tax effort has remained more or less constant for the last two decades. We have also seen that by international standards, Mexico's tax effort is low. Given Mexico's level of per capita GDP and general economic structure, by international norms Mexico's tax effort could be up to six percentage points of GDP higher than it is now. Although the budget balance of the last six years can be taken as an indication of equilibrium between tax effort and expenditures, this fiscal equilibrium does not preclude the possibility that the government's desired level of expenditures is higher that the one observed. In this case, tax effort should be raised.

Tax Structure

Mexico's tax revenue structure is similar to that of other modern tax systems, including OECD countries. The share of federal revenue into general government revenues has declined slightly over the last two decades from close to 88 percent in the early 1980s to 83 percent in 1998. Some of the difference went to social security revenues and to subnational government own revenues (Table 4). From a revenue viewpoint, Mexico remains a centralized country. In 1998, subnational government own revenues represented less that 6 percent of general government revenues.[6]

The federal government structure counts on income taxes (PIT and CIT, including the gross asset tax) as the most important source of revenue. In 1998, income taxes represented 31 percent of total federal revenues (Table 5). The relative importance of

[6] As indicated in Table 4, the measurement of social security revenues during the last decades is clouded because of changes in reporting and definitions.

income taxes has fluctuated significantly over the last two decades, reflecting the frequent changes in tax policy, the high sensitivity of income taxes to the business cycle, fluctuations in revenues from petroleum, the significant spike in privatization proceeds in the early 1990s, and possibly the role of how income taxes have been adjusted with respect to inflation.[7] Income taxes have represented as low as 23 percent of federal revenues in 1987 and as high as 36 percent in 1980-81.

The second most important source of federal revenues is the VAT, which in 1998 represented 22 percent. The relative importance of the VAT has also fluctuated widely during the last two decades reflecting, among other things, the increase in collections in 1990 after the federal tax administration took over collections from the regional administrations and the drop in 1992 in the general rate from 15 to 10 percent and its increase again during the 1995 recession. The third most important source of federal revenues is hydrocarbon duties paid by PEMEX. A very close fourth source of revenues is excise taxes, which have experienced a significant increase over the last two decades.

The direct contribution of hydrocarbon duties hides the relative importance of PEMEX as a source of revenues for the federal government. The recent increases in collections from taxes on domestic goods and services (the VAT and excises) have come from taxes on petroleum products.[8] The "hydrocarbon duty" is comprised of an oil extraction royalty, the regular income tax and an excise tax. However, PEMEX also contributes to federal revenues paying ordinary VAT and custom duties, as well as an "excess profit fee" on windfall gains from oil exports. Although PEMEX recorded separate payments have declined since the early 1980s, when all taxes are added, revenues from PEMEX operations still represent the same share of federal revenues that they represented in the early 1980s, around 34 percent. The relative importance of taxes on international trade has decreased as expected from trade liberalization before and after NAFTA. However, import taxes still represented 4 percent of federal revenues in 1998.

By comparison to other Latin American countries, the composition of tax revenues at the central government level in Mexico shows an adequate level of tax effort (as percent of GDP) for income taxes, but a relatively lower level of effort for domestic taxes on goods and services. For example, Chile, Costa Rica and Peru all raise a higher share of GDP through VAT and excises than Mexico (Table 6). Thus a logical area for an increase in tax effort, if the government is committed to raise the overall level of tax effort in terms of GDP in the new round of tax reform, is to raise collections from the VAT and also perhaps from excises.

[7] According to Gil Diaz (1995) the CIT showed decreasing revenues during the 1980-87 period in part due to high inflation and the Oliveira-Tanzi effect of inflation on tax collections. With more frequent filing and adjustment for both liabilities and assets, the effect supposedly disappeared thereafter. For the PIT the lack of indexation until 1988 worked to produce more revenues, but after indexation this advantage was lost. On the whole, Mexico's tax system does not appear to have gained or lost due to inflation over the last two decades. The regression of real revenues from income taxes on the inflation rate is not statistically significant after controlling for serial correlation and real GDP.

[8] See World Bank (2000).

In summary, this section has shown that despite its appearance of normalcy, Mexico's tax structure is still too dependent one the economic activity associated with petroleum. This is worrisome due to the fact that petroleum is, of course, an exhaustible source of income. There would appear to be a need to increase taxes on other types of economic activity. International comparisons would seem to indicate that one appropriate way to do this is by increasing VAT collections.

Buoyancy of Revenues

Another important property of a tax system is its ability to generate automatic growth in fiscal revenues over time. The adequate rate of growth depends on the expenditure goals of government. A natural benchmark for dynamic performance of a tax system over time is its ability to grow at the same rate as GDP. Tax revenues increase over time either because tax bases grow with the economy or because changes in the tax laws either broaden tax bases or increase tax rates, or because of better enforcement of an existing tax structure. When only the first effect is present the ability to grow is measured by the elasticity and when all effects can be present the ability to grow is measured by the buoyancy[9].

This means that the question of revenue adequacy also needs to be understood from a dynamic sense. The tax system needs to have an ability to collect more as the economy as a whole grows. This is an important feature of any tax system because the demand for public services is very likely to expand as the economy grows. If tax revenues grow automatically with the entire economy, a balanced budget can be maintained without a recurrent need for introducing new taxes or raising the rates of existing ones.

Formally, the elasticity is defined as the ratio of the proportional change in revenues to the proportional change in the tax base. It is often the case that GDP is used in lieu of the tax base. If the elasticity is greater than one, the government is able to expand the provision of goods and services as the economy grows and is even able to reduce taxes by lowering tax rates, for example. Conversely, if the elasticity is less than one, the government will struggle to keep up with the services demanded by a larger economy and to avoid budget deficits will have to introduce new taxes or increase the existing ones by increasing tax rates, for example.

A correct measure of tax elasticities requires the observation of changes in tax revenue arising exclusively from changes in the tax base. However, often the observed changes in tax revenues are also the result of changes in the structure of taxes, such as tax rates or the definition of the tax base, or also changes in the tax administration, such as a

[9] The elasticity property is more important because it gives government the ability to respond to increases in the demand for public services without having to interfere continuously with the tax system with ad hoc revenue raising measures. Elasticities are more difficult to estimate because it is necessary to control for the impact of changes in the tax structure and changes in enforcement.

stricter enforcement of the tax laws. When it is not possible to disentangle all these different effects, the ratio of the proportional change in tax revenues to the proportional change in the tax base of GDP is known as the buoyancy of the tax to differentiate it from the stricter concept of elasticity. Although some attempt has been made here to control for the impact of discretionary changes in the tax structure, the values reported should be interpreted as buoyancy coefficients rather than elasticities.

This section examines the buoyancy of the Mexican tax system using two similar approaches. In the first case, we calculate the year-to-year buoyancy for overall revenues and each separate revenue source with respect to GDP. In the second case, we use regression analysis to estimate the average buoyancy of tax revenues over the period covering the last two decades.

The average year-to-year buoyancy of total general government revenues with respect to GDP is 0.93 (Table 7) for the period 1980-1999. For federal government revenues, which, as opposed to general government revenues, do not include social security contributions and subnational government tax revenues, the average year-to-year buoyancy for the period is 0.88. This buoyancy is a composite of the behavior of federal tax revenues, with an average buoyancy for the period of 1.2, and federal non-tax revenues, with an average buoyancy of 0.71. As shown in Table 7, the year-to-year buoyancy for individual sources of revenues show both the impact of changes in the economic environment, including recessions[10], changes in the price of oil, and changes in tax structure, such as the lowering of the general VAT rate in 1992.[11] The buoyancy coefficients for the separate taxes exhibit several interesting patterns. For the last three years (1997-1999) the buoyancy of all major taxes (income taxes, VAT and excises) has been significantly greater than unity, meaning that these tax revenues have increased more than proportionally with GDP. This may reflect both the recovery from quite low performance in the previous years and also that the current tax structure has a built-in elasticity that can generate an increasing tax effort if no discretionary tax measures are adopted to offset this pattern. The periods 1993-1997 and 1989-1992 are both periods of low buoyancy, the first because of bad economic conditions and the latter because of discretionary changes in the tax structure. But note that with just a few exceptions, the major taxes had not shown significant buoyancy in the 1981-1986 period

[10] During the 1980-1999 period Mexico has suffered four recessions 1982-83, 1986-87, a mild recession in 1988, and a sharp but short recession in 1995.

[11] Note that some of the buoyancy coefficients in Table 1.9 are negative. This is due to a fall of revenues in nominal values from year to year. For example, non-tax revenues declined sharply from 83 billion pesos in 1992 to 51 billion in 1993.

Turning to the second approach for estimating the buoyancy of the tax system, we use regression analysis to derive the average buoyancy of the tax system over the period 1980-1999.We regress the natural logarithm of the revenue series on the natural logarithm of the GDP series. The resulting coefficient for GDP provides an estimate of the average buoyancy of the revenue series over the period 1981-1999.[12] These results are reported in Table 8. The most significant finding is that the estimated buoyancy for most revenue aggregates including general government total revenues, federal government total revenues, and federal tax revenues are unitary or very close. The same is true for the major individual taxes. The only significant divergence is for hydrocarbon duties which show a buoyancy over the entire period of 0.88. In short, Mexico's tax system, after many structural reforms, improvements in tax administration, and significant turns in the business cycle, managed to yield increases in tax revenues that just kept pace with GDP, neither faster nor slower. This should not be a surprising result given that the ratio of tax revenues to GDP has remained quite constant over the period. Of course, these results support (although do not prove) the hypothesis that Mexico's policy makers steered the system over the last two decades so to maintain a given level of tax effort.

In summary, the buoyancy of Mexico's tax system with respect to GDP has been kept remarkably very close to unity. Given the significant changes in both GDP (tax bases) and in tax structure, it would appear that the unitary buoyancy has been carefully engineered by the government during the entire period. Of course, it is not surprising in this scenario that the level of tax effort with respect of GDP has not grown automatically as the result of the elasticity of some taxes. If one of the goals for the new round of tax reforms is to increase Mexico's level of tax effort, the government needs to make sure that the new tax structure is dynamically elastic so that as GDP grows so will tax revenues in the same or a higher proportion.

Revenue Stability

[12] This analysis was refined by using dummy variables as proxies for major changes in the structure of the taxes and also by substituting GDP by variables that could match more closely match the actual tax base of the revenue source in question. For example, for the Value Added Tax (VAT), we proxy by introducing dummy variables for each of the major structural changes in the VAT and by replacing GDP with private consumption. Since the resulting estimated coefficient for buoyancy did not differ much from those estimated with a simple regression and GDP as the tax base, only these latter results are discussed.

Another significant feature of tax systems is their relative revenue stability over time. We use the coefficient of variation[13] to examine how the different sources of revenues vary relative to their mean over the 1980 to 1999 period (Table 9). As the coefficient of variation increases, the relative dispersion or variability of the series increases. Several results are noteworthy in Table 1.5. All aggregate measures of government revenues show a high degree of volatility over the entire period with the coefficient of variation for federal revenues of 1.16. Federal tax revenues show more volatility, with a coefficient of variation of 1.22, than federal non-tax revenues, with a coefficient of 1.11. Correspondingly, the most important taxes (income, VAT, and excises) show more volatility over the period than revenues form hydrocarbon duties. Volatility of all tax sources was higher, often more than double, during the decade of 1980s than the decade of the 1990s, for the most part due to differences in inflation during the two periods.

Revenue instability at the federal level of government is a positive feature if revenues move with the business cycle so that they expand more than proportionally during expansions and contract more than proportionally during contractions. In this case, the tax system works as a built-in stabilizer and helps moderate the swings in the real economy caused by the business cycle. Revenue stability, or lack of volatility, is a desired characteristic at the subnational level, since state and local governments have in general less ability, and this is true too in Mexico, to borrow during business activity contractions and many of the services provided at this level (such as education) require a steady flow of funds. However, as shown in Table 9, subnational taxes in Mexico do not appear to be less volatile than federal revenues for the period (1990-99) for which subnational data are available.

[13] The coefficient of variation is defined as the ratio of the standard deviation of the series to its mean value.

Has the volatility of federal revenues in Mexico worked as a built-in stabilizer to moderate the business cycle? This question has been studied recently (World Bank, 2000) and the results of the analysis are summarized here. Whether tax revenues have moved with the cycle or against the cycle is approximated by the correlation coefficient between the revenue series and the cyclical component of real GDP.[14] Over the 1980-1999 period total federal revenues were not tightly correlated with real GDP. The correlation coefficient was only 0.2. This result is the composite of two elements. First, tax revenues moved positively with the cycle as expected since most tax bases are positively related to GDP. But, second, non-tax revenues (which include most importantly hydrocarbon duties) were approximately acyclical, meaning they did not show any pattern vis-à-vis GDP. Therefore, even though most tax revenues will tend to work as built-in stabilizers, their impact on the business cycle is relatively weak in Mexico. One of the reasons for this weakness is that these taxes represent only a fraction of public sector revenues. Between one-third and one-fourth of federal government revenues still come from petroleum and these revenues moved independently of the business cycle. We may add to the observations in World Bank (2000), that there is also evidence that discretionary tax policy has been pro-cyclical. Often during the past 20 years, Mexico's government has decreased tax rates and taken other measures that reduce revenues during the expansion phase of the business cycle (such as the reduction of income tax rates in 1989 and 1994) and has increased rates or taken other measures that increased revenues during the recession part of the business cycle (such as the increase in the general VAT rate during the sharp downturn in 1995 associated with the peso crisis). This behavior fits well, of course, with the hypothesis that the overriding objective, explicit or implicit, of Mexico's tax policy has been to maintain a constant level of tax effort.[15]

Mexico appears to have followed a common pattern in many other Latin American countries when pursuing pro-cyclical discretionary tax policy (tax rates are increased during recessions and decreased during expansions).[16] This behavior has been explained as quite rational, however.[17] Latin American countries, as many other developing countries, have large fluctuations in tax bases (larger anyway than those in developed countries). Compensating for these large fluctuations will require obtaining large budget surpluses during expansions and large budget deficits during contractions. Politically, it becomes too hard to run big surpluses in times of plenty given all competing demands for expenditures rather than retiring national debt. Therefore governments may proceed to lowering tax rates rather than seeing the resources "wasted" on unnecessary public expenditures.[18]

[14] The latter can be interpreted as the deviation of GDP from its long-term path.

[15] During the last two decades one can find counterexamples to the assertion that discretionary changes in tax policy have been pro-cyclical. But in fact, it appears that the Mexican Government over the past 20 years never set out upon tax reform with the explicit objective of increasing revenues as a percentage of GDP. The main objectives of these reforms were efficiency and some time equity. In some cases the objective was clearly one of increasing revenues as when the contribution from the petroleum sector decreases in the late 1980s) but this increase in revenues was only to bring actual tax effort back to the average level and not to increase it as a percentage of GDP.

[16] This pattern is common to other developing countries but not among OECD countries. See Gavin and Perotti (1997).

In summary, Mexico's tax system has provided an unstable foundation to the federal budget and the behavior of overall revenues has tended to increase rather than dampen the swings in real economic activity induced by the economic business cycle. Even though this pattern does not appear to be uncommon in Latin America, it is nevertheless undesirable. The government must be committed to allowing the tax system to properly work as a built-in stabilizer. Increases in collections during business expansions need to be allowed to do their work of cooling down the economy rather than be nullified by discretionary tax cutting policies.

Excess Burdens and Economic Distortions

A salient feature of Mexico's tax system is the important role played by the special treatment of particular sectors and sources of incomes. Because of the cost in foregone revenues and because of their effects on efficiency through the misallocation of resources and on horizontal and vertical equity, these special treatments should be a priority area for reform. Under the CIT, there is a special treatment for sectors such as agriculture and transport. Large companies benefit from the lack of oversight on consolidated returns. Insurance companies benefit from the special treatment granted for their income from interest and foreign exchange gains. Under the VAT border areas benefit from a lower tax rate of 10 percent vis-à-vis the general rate of 15 percent. Under the PIT, special treatment is granted to several sources of income, including fringe benefits, overtime and bonuses, pension income, capital gains for the sale of stocks and copyrights.

The case for the elimination of these special treatments is based on the costs imposed on taxpayers as a whole. The discussion of special treatment often overlooks the simple fact that the revenues lost due to these special treatments need to be made up with higher taxes in other activities or sectors in the economy. These additional taxes can be more distorting to production and employment than the lack of special treatments. The additional taxes forced by the existence of special treatments can also add to horizontal and vertical inequities in the distribution of tax burdens.

But, the issue of equal treatment of taxpayers goes beyond equity concerns. To the extent that some activities are more heavily taxed than others the allocation of resources is affected. Too many resources will be allocated in the lightly taxed sectors and too few in the more heavily taxed sectors. The misallocation of resources produces an excess burden of taxation, which simply means that the economy ends up producing less income out of the available resources. Other forms of excess burdens occur when, for example,

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[17] See Talvi and Végh (2000)

[18] Allegedly, this was the budget philosophy publically espoused by Domingo Cavallo, Minister of Finance in Argentina during 1991-96. (Talvi and Végh, 2000).

the tax system induces a company to invest in buildings when in the absence of tax preferences it would have invested in machinery and equipment, or when companies are encouraged by the tax system to finance their capital through debt rather than equity -- leading to thin capitalization of businesses. As shown below, Mexico's tax system presents some important examples of distortions of business decisions.

Distortions in economic behavior and therefore excess burden losses are not exclusive to businesses. Individual taxpayers are also exposed to excess burdens when the tax system alters their savings and labor supply decisions. Even though most of the distortions introduced by the tax system are unintentional, this fact should not lead to the conclusion that they are not important. Reforming the tax structure to minimize tax-induced distortions or the excess burden of taxation can significantly increase taxpayers' welfare without decreasing their taxes paid.

Below we make an attempt to quantify some of the distortions induced by the current tax system by estimating marginal effective rates of taxation (MERT). This approach looks at the impact of taxes on marginal or incremental decisions by economic agents.[19] The MERTs estimate is the level of tax arising for a firm when it decides to invest one more unit of capital. When the MERTs are positive, they reflect that investment activities are discouraged. However, negative MERTs are also possible. In this case, the economic activity in question is being encouraged through a subsidy. Taxes on capital income, more importantly the CIT, can affect not only the level of investment but also its composition. Differences in MERTs, therefore, lead to distortions in the allocation of resources, reducing output and also, by reducing investment, slowing down economic growth.

This section focuses on the computations for marginal effective tax rates (METRs) of the Mexican corporate tax system for domestic investment.[20] The computations of the METRs for foreign capital investment in comparison with those in Canada and the United States are discussed elsewhere in this report under the impact of NAFTA. For domestic firms, METRs are calculated for eight sectors: agriculture, manufacturing, construction, transportation and storage, communication, public utility, wholesale trade and retail trade. The simulation for the Mexican system is expanded to include the tax preferential treatments for exporters, small sized firms and related simulation for optional changes[21].

The results presented Table 10 provide marginal effective tax rates on the domestic capital investment in Mexico combining the three preferential tax regimes, respectively, with the general one. The inter-sector METR dispersion is shown to illustrate the inter-sector tax distortion within each of these three tax combinations. As a

[19] See, for example, McKenzie, Mansour and Brulé (1998).

[20] Appendix 1 provides a description of the methodology used for METR calculation.

[21] Under the current Mexican tax regime, firms in Mexico are taxed differently according to the nature of business, the size and the location of the firm. Refer to Appendix I for details.

reference, we also provide a simulation for METR on capital and the related inter-sector METR dispersion in the US within the same table (Panel 2).

The first column of Panel 1 of Table (10) shows that, with a simplified tax regime, or cash-flow tax applicable to the agriculture and the land transportation industry[22], the marginal effective tax rate varies significantly from –38 percent for the agriculture sector, which represents a hefty subsidy rate, to over 24 percent marginal tax rate for the trade sector. Note that the land transportation industry also has a negative METR, which also indicates a tax subsidy on the capital investment made by this sector, but at a –7 percent, the rate of subsidy of the transportation sector is markedly lower that the one for agriculture. The variation in METRs among other sectors is mainly caused by the variation in the tax depreciation allowance. As a result, the inter-sector tax distortion, measured by the METR dispersion is at a rather high level of 13 percent.

Alternatively, if we assume that the cash-flow tax regime is not available but rather all qualified small taxpayers take advantage of a very low tax of 0.25 (or 2.5 percent on gross income), the METRs for all sectors but agriculture and land transportation would drop significantly (Column 2) compared with the "cash-flow tax case" (Column 1). Of course, now both agriculture and transportation face positive MERTs. Notice by unifying the tax regime, the inter-sector tax distortion measured by the inter-sector METR dispersion could be reduced from 18 percent to 3.0 percent. [23]

Third, we assume that all the firms are taxed equally regardless of their size and that all agriculture firms would be subject to a lower CIT rate of 17.5 percent, which is 50 percent of the regular CIT rate at the present time. The simulation shows, that in this scenario, the inter-sector tax distortion would be further reduced as indicated by a further lowered inter-sector METR dispersion of 2.8 percent.

[22] We assume that the land transportation sector accounts for the majority of the transportation industry in Mexico in order to ignore the difference in tax treatment between the "land transportation" and other transportation sector. A more accurate estimate can be accomplished when the data is available for break down of the transportation industry into these two sectors.

[23] This simulation is undertaken by applying the Canadian proportion of small firms within each sector and assuming the average gross-receipt tax rate is 1.35% (= 1/2 [0.25% + 2.5%]). We first estimate METR for small and regular taxpayers respectively and then estimate the weighted-average METR by sector using the proportion of small firms by sector as weight.

The main tax factors contributing to the inter-sector tax distortion include the level of various tax rates and the variance in tax rate and tax allowances across sectors[24]. It is obvious that the higher the statutory tax rates and the wider the gap in tax rates and tax allowance between sectors, the higher the inter-sector tax distortion. To further illustrate this observation, we provide the same simulation for the US domestic firms in Panel 2 (Table 10). Here, we use a combined CIT rate of 39.5 percent for the simulation of the US case, which is much higher than the general CIT rate (35 percent) in Mexico. Furthermore, the US does not allow for indexation for inflation, which certainly would tend to inflate the inter-sector tax distortion. Despite these factors, the inter-sector METR dispersion in the US is only 2.9 percent (Column 1, Panel 2, Table 10). By applying the Mexican CIT rate of 35 percent and its inflation-adjustment rule to the US simulation, we found that the inter-sector METR dispersion would be further lowered to 2.3 percent (Column 2, Panel 2, Table 10). This simulation indicates that there are other tax factors (e.g., the tax depreciation allowance varies significantly by sector[25]) in the Mexican CIT system which cause additional inter-sector tax distortion. For example, our simulation shows, by increasing the capital allowance from 10 percent to 15 percent for most assets used by manufacturing, transportation, public utility and trade sectors, the inter-sector METR dispersion in Mexico could be further reduced to 2.3 percent.

In summary, the major findings from the MERT calculations for domestic investment in Mexico show that:

(i) The cash-flow tax regime available only to agriculture and land-transportation sectors is the main cause of the inter-sector tax distortion within the Mexican corporate tax system. Although a cash-flow tax is appealing in tax compliance and sounds simpler in design, it is a source of significant distortions. If we add the costs of administration and the little international experience available, there is a strong case for its removal .

(ii) The preferential tax regime granted to small taxpayers is less distortionary by comparison to the sector-oriented cash-flow tax, but again there is no good justification for protecting the currently privileged sectors. The only good case that can be made is to preserve the small enterprise regime but for any sector.

(iii) If a political concession needs to be made for agriculture, the least distortionary way to go is to use an equivalent CIT rate across all sectors, except for agriculture, which would still use a lower rate.

[24] Non-tax factors such as inflation rate, interest rate, financing structure and the capital structure also have an impact on the inter-sector tax distortion. For example, with a higher (lower) discount rate, which is determined by the inflation rate, interest rate and financing structure, a given depreciable asset could be taxed at a higher level since the present value of its tax depreciation allowance may be worth less (more). When such a higher (lower) taxed asset accounts for a bigger share of a capital used by a given sector, it may contribute to a higher (lower) METR in this sector compared to other sectors. In the Mexican case, the inflation rate does not matter in our METR estimate since Mexico has adopted practically full indexation for inflation.

[25] Mexico's tax depreciation allowance scheme is discussed in Appendix 1 to the NAFTA section.

(iv) In addition, sectoral tax distortions could be further alleviated by narrowing the existing gaps in tax depreciation allowances across sectors.

The Distribution of Tax Burdens

Two basic principles are commonly used to judge how equitably tax systems perform. One is the principle of vertical equity or how tax burdens are distributed among taxpayers with different levels of income. The vertical distribution of tax burdens can be progressive, proportional, or regressive with respect to income. Typically it is assumed that a desirable distribution of tax burdens is one that shows some degree of progressivity with respect to income (so that those individuals with higher incomes pay proportionally more in taxes) and one in which the poorest households pay little or no tax. The second principle is that of horizontal equity, which simply says that taxpayers with the same income or tax base should pay equal taxes. The discussion in this section is divided into these two main topics.

Vertical distribution of tax burdens

With the exception of a very recent study,[26] no estimates appear to exist on the vertical and horizontal incidence of the tax system in Mexico. The lack of information on the actual distribution of tax burdens in Mexico appear to have led to diametrically opposed perceptions, ranging from the tax system being too punishing to the poor to the tax system being too redistributive because only a few among higher income groups pay taxes. In some important way, this lack of serious information on the actual distribution of tax burdens has contributed to the lack of voluntary compliance because of the generalized perception that many are not contributing their fair share of taxes.

The issue of vertical equity goes beyond the lack of information. Even if information existed, it is often hard to find consensus on what is the desirable degree of progressivity for the tax system. This reflects the fact that vertical equity, in essence, is not an economic or technical question, but rather a political or value-loaded one.

[26] See GEA Económico (1999). These results are discussed further below.

Even if there is some consensus on what the proper vertical distribution of tax burdens should be, several common mistakes are often made in designing tax policy in the pursuit of vertical equity. First, vertical equity should be viewed from the perspective of the entire tax system rather than by examining particular taxes in isolation. The effective administration of some taxes or the achievement of other desirable objectives such as minimizing economic distortions may require sacrificing the objective of a progressive distribution of tax burdens. Second, often times tax measures taken to protect the poor of making taxes more progressive simply backfire by actually making taxes less progressive or even regressive. A case at hand is the use of zero rating for some domestic goods such as food and medicines in Mexico.[27] The equivalent amount of tax expenditures (foregone revenues) could be used much more efficiently to redistribute income or increase the welfare of the poor through the expenditure side of the budget that specifically targets the funds to the true poor. Third, the largest potential for redistributional policies in favor of the poor are those from the expenditure side of the budget, when governments spend more funds on education, health and social assistance programs, and not from the revenue side of the budget through tax policy.[28] This is particularly true in countries like Mexico where the overall tax effort, as measured by the ratio of tax revenues to GDP, is relatively low and social spending programs are below international norms. From this perspective, it may be much more redistributive to have tax systems that are less progressive in themselves but collect more revenues which may be spent on social programs.[29]

So the agenda for vertical equity in Mexico is first to determine what the actual distribution of tax burdens implied by the current system is. Second, some national consensus must be found on what is the desirable level of progressivity before embarking on the next round of tax reform. On reaching this consensus, it needs to be remembered that progressivity should not be measured on a tax by tax basis. It also needs to be remembered that higher progressivity (or a more effective redistribution income) can be achieved through expenditures as opposed to taxes.[30]

To answer the first question, we have estimated the incidence of the main taxes in Mexico. The taxes actually analyzed include: Personal Income Tax (wages only), Payroll Taxes earmarked to Social Security Accounts, Corporate Income Tax, Value Added Tax,

[27] As noted by Casanegra et al. (1997), the distribution of the tax expenditures implied by the zero rating of food items is quite unequal and significantly regressive. For 1994, using the National Consumer Expenditure Service for that year, Casanegra et al. (1997) find that over 33 percent of the total subsidy accrues to the two highest income deciles of taxpayers while less than 9 percent of the total subsidy accrues to the two lowest income deciles of the population.

[28] Of course, more government spending does not necessarily translate into effective redistribution of income. Expenditure programs need to be effective and efficient.

[29] See "The Distributional Aims of Fiscal Policy" (chapter 8) IDB (1999).

[30] In fact, if we allow for the fact that the redistributional impact and the welfare of the poor may be more effectively addressed through the expenditure side of the budget, decreasing the progressivity of Mexico's tax system may be acceptable strategy if a significant increase in tax collections is effectively spent on social programs that benefit the poor more than proportionally.

Excises and Import Duties. These taxes account for approximately 95 percent of the taxes collected by the Federal Government.

The methodology used to assign tax burdens assumes households ultimately pay all taxes, therefore these payments must equal receipts. Therefore, we ignore the existence of "excess burdens" or the welfare losses suffered by taxpayers as a consequence of the distortions in economic behavior induced by taxes. In order to proceed with the incidence estimations we need a database containing information on household expenditures and sources of income. The database used here is the *Encuesta Nacional de Ingreso-Gasto de los Hogares* (ENIGH) from INEGI for 1996 (latest available). This longitudinal survey of 14,000 households provides detailed information on their sources of income, expenditures, housing conditions, and personal characteristics of the members. The survey also contains a weighting variable that allows replicating the statistics at a national scale.

The sources of income reported in the ENIGH include income from wages, business activities, fringe benefits, interest, rental income, transfer payments, capital income, income in kind, and imputed income from owner occupied housing. On the expenditure side this survey contains information on monetary and non-monetary expenditures on food, transport, house maintenance, personal items, education, rent, clothing, health, transfers, and capital expenditures, among others.

It should be noted that the methodology followed here to analyze tax burdens has several limitations. First, we do not have a measure of the permanent income of each household. This problem is directly linked to the fact that we are using a single observation in time. In the case of using the 1996 survey, a bias on results may arise with respect to a "normal" situation, due to the fact that in that year the country was still recovering from the 1994 peso crisis. Second, income categories are reported on an after-tax basis, thus in order to estimate the burden we must first estimate income on a pre-tax basis. Finally, as mentioned, this methodology does not allow for the existence of excess burdens or deadweight losses, and leaves out the imputation of tax arrears.

The analysis of direct taxes includes the Personal Income Tax (on wages & salaries only), the Corporate Income Tax (tax on assets, on income from business activities and on rents and interest primarily)[31] and Payroll taxes earmarked to Social Security Funds. In order to arrive at the incidence of these taxes, several calculations are made to provide a pre-tax measure of income.

For the Personal Income Tax it is assumed that the burden is fully borne by the supplier of inputs, in this case labor. This is a reasonable assumption based on the evidence of inelastic labor supply in Mexico. The taxation of wages and salaries includes progressive tax rates, "subsidies" (truly credits which work as a percent reduction of the tax liabilities) and a "credit" (truly a negative tax or transfer) to salary that decreases as

[31] This composition of categories included in PIT and CIT is guided by Ministry of Finance estimates of the split of the revenue collected under the Impuesto Sobre la Renta (ISR).

taxable income increases. Given that we do not have income reported on a pre-tax basis, we gross-up the reported net income on wages and salaries by developing a tax calculator based on 1996 tax income parameters. Following Casanegra et. al. (1995) the tax liability is estimated by the following formula:

$$T = t_1 + (t_s / 100) * (Yg - x_1)$$

Where t_1 and t_2 are tax parameters for a given bracket, x_1 is the lower limit to the bracket and Yg is the gross taxable income. For the subsidy we have:

$$S = s_1 + (s_2 / 100) * (t_2 / 100) * (Yg - x_1)$$

Where s_1 and s_2 are the subsidies parameters. This subsidy *should* be adjusted downward by the average level of fringe benefits received as a proportion of Yg. However, since this adjustment is made at the average company level rather than on an individual basis (and we lack of that kind of information in the survey), this adjustment is not taken into account in the estimations.

If we define net income as:

Yn = Yg – T + S + C

where Yn is net income and C is the salary credit, we can then use these three equations to estimate gross income as:

$$Yg = \frac{[Yn + t_1 - s_1 - x_1 * (t_2 / 100) * (1 - s_2 / 100) - C] * 10{,}000}{10{,}000 - (100 * t_2) + (s_2 * t_2)}$$

However, to estimate gross income we must first determine the corresponding net income brackets, yet the presence of a credit impedes this estimation (overlapping and blanks between brackets are some of the problems that arise). Therefore, we proceed by only applying the tax and subsidy rates to obtain a "first-step" estimator of Yg, that in turn will be used to estimate the corresponding credit, C, that will be subtracted to obtain the final gross income.

To estimate the incidence of the PIT we calculate a collection factor (*a*) that matches total tax liabilities estimated from the survey (expanded at a national scale) (*Ts*) to the collected revenue (*C*):

$$Ts * a = C$$

This factor is applied to each individual imputed tax liability to obtain the effective individual liabilities:

$$T'_i = a * T_i$$

Note the presence of a credit to salary in the system generates the possibility of negative taxes or refunds to the individuals based on their income level. Therefore, the burden of collected revenues must be assigned only to those taxpayers with *positive* payments. For the other households the refunds are calculated from the imputation process. [32] In the event final gross income obtained is negative due to the credit imputation, then it is assumed that these individuals are not actually paying personal income tax, and no gross-up process is undertaken on their income.

For the payroll tax earmarked to social security funds the estimation is done taking into account the rules of the social security system as it was in 1996. The structure used to gross up income is based on the Instituto Mexicano del Seguro Social (IMSS) rules.[33] Under this scheme contributions amounted to 8.5 percent of the "base salary,"[34] with 5 percent paid by the government, 90 percent paid by the employer, and 5 percent paid by the employee. The assumption used to estimate the incidence of this tax is, again, that labor bears the entire burden (in this case 95 percent). This burden is assigned in proportion to the share of total income from the base salary. One problem underlying this estimation is that we cannot identify with precision the individuals who actually contribute to the social security system, so there may be a bias for wage earners in the lowest deciles because some are in the informal sector. For the sake of consistency, those individuals whose incomes were not taxed in the estimation of the PIT, are assumed not to pay taxes at this stage either.

In tax burden estimation perhaps the most controversial is that of the Corporate Income Tax (CIT). In studies of tax burden estimation there is no consensus on who bears the final burden (capital owners? labor? consumers?) In Mexico the law on income tax for business activities gives the taxpayer the possibility of choosing between paying a flat 34 percent rate (in 1996) or accumulating this incomes to pay an individual tax with progressive rates. This system avoids double taxation on dividends. For the present study, the tax liability was estimated as if taxpayers choose to pay the individual income tax on income from businesses,[35] rents and interests from the non-financial sector. For interest from savings accounts, fix-term investments, and equity instruments, a schedular treatment is made. To estimate the tax liability in this case we make an approximate estimation of the level of capital generating such interests and tax such capital. In other words, interest (I) would equal on average:

$$I = K * r_n$$

[32] The estimated refunds for individuals in the first 8 deciles due to the salary credit amounts to 10 percent of total tax revenues (without social security funds) and 25 percent of ISR collected revenues.
[33] IMSS is the social security institute that covers workers in private sector enterprises. By 1996 IMSS provided coverage to about 80 percent of the insured population, so the bias of assuming their rules for the entire population is negligible.
[34] The "base salary" includes the contractual salary plus some fringe benefits. The upper bound to contributors is 10 minimum wages.
[35] Agriculture, livestock production, forestry, and fishery businesses with revenues below 20 minimum wages are exempt from this tax.

where K is capital and r_n is net interest rate (that equals $r_g - t$), and the tax liability would be:

$$t * K = K * r_g - I$$

where the gross interest rate r_g is an average of interest rates for each kind of investment considered.[36]

The estimations of the incidence of the CIT are made under two scenarios. The first assumes that capital owners bear the entire burden. The second scenario assumes that capital owners assume half of the burden and the other half is shifted to consumers in the form of a final sales tax. In order to estimate the last scenario, the CIT rates are reduced by 50 percent and half of the burden is assigned to capital owners. The other half of the burden is distributed among consumers proportionally to their share of consumption of goods and services.

For indirect taxes the general assumption underlying the estimations is that consumers bear the entire burden according to their share of consumption of the taxed goods and services. In the case of Value Added Tax (VAT), the estimation takes into account the assorted exemptions and zero-rates in the system. For simplicity, exempt and zero-rated goods are treated alike, i.e., excluded from the bundle of taxed goods.[37] The presence of exempt and zero-rated goods leads to a more or less flat incidence on the VAT, given that for households in the lower deciles, expenditures on food and medicine represent a large proportion of their total expenditure. Unaccounted for in the estimations is the 5 percent difference in VAT rates between border regions and the rest of the country, which may introduce a some bias in our results.

For excise taxes the burden was distributed according to the share of consumption of gasoline, tobacco, alcohol, bottled water, and telephone. In the particular case of gasoline the estimate took into account direct expenditures on gasoline, but also expenditures on transport services that use gasoline, which means our estimates allow shifting part of the burden to users of transport by means of higher prices. This explains why the incidence of the excise tax on gasoline is more or less flat, instead of being progressive.

Finally, for import products it is very difficult to make a precise estimation with the information contained in the ENIGH because it does not provide sufficient information to clarify the origin of each product (imported or produced domestically), and we also do not know the component of imported inputs in domestically produced goods and services. In light of this we have simply distributed the burden from import duties

[36] The categories considered are interests paid on equity instruments, saving accounts, and fixed term investments.

[37] This mainly included food, water, medicines, public transport, some expenditures on education and health, house rents, books and magazines, tickets for lotteries and games, inheritances, jewelry, etc.

according to the household share of cash expenditures on all goods and services without any further distinction. Further exploration on the incidence of this tax should take into account information on the origin of final and intermediate consumed goods in the economy and their distribution by sectors of production.

The final incidence results are presented in Table 11 for the base case scenario, where it is assumed that the burden from the CIT is fully borne by capital owners, and in Table 12 for the alternative scenario, where it is assumed that the burden from the CIT is equally divided between capital owners and final consumers.

The distribution of tax burdens for indirect taxes (VAT, excise on gasoline, other excise and import duties) is the same in both scenarios and mildly regressive. In particular, the highest income decile of the population (those with incomes over Pesos 96,689) tends to pay a smaller share of their gross income in indirect taxes than any other population decile. The reason, of course, is that the highest income group saves a higher share of its gross incomes. Also noteworthy is the fact that despite the zero rating and exemption of many basic commodities, the lowest income deciles pay a similar share of their incomes in VAT to that paid by higher income deciles.

In the base case scenario, the incidence of income taxes (PIT and CIT) is progressive. The incidence of the PIT is particularly progressive because of the negative tax received by eight of the population deciles due to "credits" and "subsidies" in the current law, and the much higher share of gross income paid by the highest population decile. The progressivity in the distribution of tax burdens for the CIT also lies in the higher share of gross income paid by the two highest income population deciles, especially the latter. For social security taxes, the incidence follows an inverted U-shape. Taxpayers in middle income deciles, who are more likely to earn their income in wages from the formal sector, pay a higher share of their gross incomes that those at the top and bottom of the income distribution. This effect is also helped by the fact that social security contributions are capped at some income levels.

The distribution of the total tax burdens in the base case scenario is overall progressive. The lowest income decile ends up paying about 4 percent of their gross income in taxes while the highest income decile ends up paying 27 percent. The share of gross income paid by the in-between deciles rises smoothly from the bottom to the top.

In the alternative case scenario, the main difference is in the distribution of tax burdens for the CIT. The incidence of other taxes as a share of gross income differs in some cases from the base case scenario because of slight differences in the computed gross incomes. (See Tables 14 and 15 for the two distributions of gross incomes). Now the distribution of tax burdens for the CIT is basically proportional. This, of course, reflects the fact that in the alternative scenario 50 percent of that tax is assumed to be paid by consumers. The impact of this alternative assumption on the overall distribution of tax burdens in Table 12 is to reduce the degree of progressivity. Part of the tax burden of

middle to high-income groups is shifted to lower income groups. Nevertheless, the overall incidence of taxes in Mexico remains progressive.

An important part of estimating the incidence of taxes is the derivation of income distribution among taxpayers. Here we present three distributions of income: the distribution of income nest of taxes (Table 13), the distribution of gross (pre-tax) income in the base case scenario (Table 14), and the distribution of gross (pre-tax) income in the alternative case scenario (Table 15). As already mentioned, the distributions of gross income in the two scenarios differ because of the different assumptions made in the grossing up procedures, discussed above.

Several things are notable in these distributions of income. First, Mexico's tax system starts with a very unequal distribution of income across population deciles. While the top decile receives 40 percent of total gross income, the bottom decile receives less than 2 percent. Another way to illustrate the current inequality in the distribution of income is to remark that the two top deciles (one-fifth) of the population receive two-thirds of total gross income and all the rest (four-fifths) of the population receives the remaining one-third of total gross income. Second, the impact of the tax system on income distribution, despite the fact of being quite progressive, is very limited. The distribution of net (after-tax) income becomes more equal than the two distributions of gross (pretax) incomes, but the changes are quite small. This illustrates well the principle discussed above that the most effective way to redistribute income is not through the tax system but through the expenditure side of the budget.

Horizontal distribution of tax burdens

There is some evidence that Mexico's tax system does not perform well at taxing equally individuals with the same income level. The most important source of horizontal inequities, but also the hardest to measure, is tax evasion. The large, and growing, size of the informal sector means that businesses with equal incomes pay very different taxes and some none at all. Similarly, under the individual income tax, employees subject to withholding tend to bear a disproportionate share of the tax because professionals and other self-employed are more able to underreport income or escape tax altogether. A second important source of horizontal inequities is the tax law itself. Unequal treatment of individuals with the same income arises because of the exemption of some forms of income, such as is the case for (previously untaxed) capital gains from the sale of securities, different treatment of some forms of consumption, such as is the case for the zero rating of some goods under the VAT, or because of different effective tax rates paid by different sectors, such as is the case under the current special tax regimes of the corporate income tax for transportation, agriculture and publishing vis-à-vis other economic sectors.

Horizontal inequities also can arise when the tax laws are explicitly used to protect the poor or bring more equity among taxpayers with particular aspects of the law. This is the case with Mexico's current negative income tax for low-income taxpayers "without" fringe benefits in their compensation package. The actual credit received by a

household depends on the number of its members that work in the formal sectors. In particular, the credit has no adjustment for the number of dependents in the household. As a result, the fiscal credit can go to households that are above the poverty line, with each of the employed members receiving a subsidy, while poorer households can be entirely excluded from this benefit even when its single employed member is in the formal sector. The discussion assumes that the final incidence of the credit is to benefit employees. However, this credit is not generally perceived by employees as a special benefit to them since typically it is subsumed in the overall salary of the employee. Given the labor market conditions in Mexico, it is possible that the credit is captured by employees via lower effective wages.

In summary, the control of evasion is probably one of the most effective ways to increase horizontal equity in Mexico's tax system. The elimination of exemptions for certain types of income and a level playing field regardless of economic sector of activity would contribute to the increase in horizontal equity of the system.

Tax Administration is Weak and Tax Evasion is High

There is little doubt that a major problem of Mexico's tax system is a weak tax administration. This weakness appears to yield high levels of tax evasion across practically all taxes. Tax evasion not only lowers receipts but it also contributes to an unfair distribution of actual tax burdens and to the perception that the current tax system is unfair. Tax evasion also leads to an allocation of economic resources that can be very different from that intended in the tax laws. The perceived unfair distributions of taxes, horizontally and vertically, appear to be an important factor in Mexico for explaining the general resistance in the private sector to any increase in the overall level of tax effort.

The weakness of the tax administration has been manifested in many different ways. It is most evident in the drastic decreases in compliance that typically have followed economic crises in Mexico. For example, in the aftermath of the Tequila crisis, Casanegra et al. (1997) found that the level of tax evasion for the VAT increased from 43 percent in 1994 to 54 percent in 1995 and further to 59 percent in the first half of 1996. These are high levels of evasion by international standards. [38]

[38] There are no many formal estimates of tax evasion in Mexico. The SHCP has estimated the level of tax evasion for the VAT from 1985 to 1998. According to those estimates, tax evasion of the VAT has represented between 30 and 46 percent of actual collections. For 1998, the estimated level of evasion was 37.5 percent. In May 2000, the Procuradoría Fiscal de la Federación announced that the overall level of evasion and avoidance represented 35 percent of potential collections. This figure would seem to be low, especially if it includes tax avoidance practices.

The major structural problems with Mexico's tax administration are reviewed elsewhere in this report and are not repeated here. However, one aspect of the tax system that needs to be emphasized in any strategy for the modernization of Mexico's tax administration is the high level of concentration of revenues among very few taxpayers. The tax administration needs to find better ways to take advantage of this feature. According to the information provided by the SHCP, in the case of the PIT about 12 percent of the taxpayers (with taxable income above 90,690 pesos) paid 112.5 percent of revenues in 1994.[39] In the case of the corporate income tax, the level of concentration is much higher. Again, according to the information provided by SHCP, less that 3 percent of the number of enterprises paid very close to two-thirds of CIT collections in 1995. Although Mexico already has a large taxpayer unit in the SAT, it is clear that enforcement measures will need to concentrate more heavily on large taxpayers to yield significant increases in revenues.

Even though Mexico' tax administration does present shortcomings, it would be unfair to lay all the blame for lack of compliance at the doorstep of the SAT. Over the last two decades, the task of tax administrators has been complicated considerably by tax policy design. Tax policy has changed frequently, resulting in confusion amongst taxpayers and making the task of tax administration more difficult. Tax reforms, quite a few of them major reforms, took place in 1978-80, 1983, 1985, 1986, 1988, 1989, 1990-91, 1993, 1994, 1995-97, and 1998.

A well observed phenomenon worldwide is that instability of the tax system (too frequent changes in policy) makes tax enforcement more difficult and can lead to decreased revenues. In the case of Mexico, in addition to frequent changes, tax policy design often has imposed on tax administrators complex rules and at times, rules which it was known *a priori* could not be enforced. A prime example is the current legislation on consolidation, which in fact requires accounting skills and training far beyond those available at SAT. As a consequence there is no one in the tax administration capable of auditing the tax returns submitted by these taxpayers. This puts certain (powerful) taxpayers in a situation where they are paying voluntary taxes, which may or may not be close to what they actually owe. Frequent changes in tax policy also creates uncertainty among taxpayers and increases compliance costs. Even well intentioned taxpayers may find it difficult or impossible to comply with the new rules. Of course, taxpayer uncertainty can negatively affect both domestic and foreign investment.

In summary, it is clear that the next round of tax reform must focus on the administrative feasibility of existing and new tax rules. A parallel reform to that in tax policy needs to be the upgrading and modernization of the SAT. Bur there needs to be a good degree of realism in the interaction between tax policy and tax administration reforms. For example, the SAT may train a team of tax administrators to audit consolidated returns. However, there is a need to ask whether the SAT will be able to retain these highly trained personnel with the current salaries in the public sector. If the

[39] Remember that Mexico's PIT has an important negative income tax component; hence a group of taxpayers can pay over 100 percent of collected revenues.

answer is no, clearly it would be more desirable to restrict or even eliminate current consolidation arrangements in the tax laws.

The Potential Tax reform Package: Feasibility, Contents, and Revenue Effects

Feasibility and Strategy: Mexico has had too many and too frequent tax reforms. As argued above, continuously tinkering with the tax systems makes tax administration more difficult, increases compliance costs, and creates uncertainty for investors. The next round of tax reform should be thought out carefully and the resulting tax system left in place for the longest period of time possible.

To be successful, the tax reform package will need to gain consensus among the main stakeholders including support at the highest level of government, tax administrators, the business sector, labor unions, and the public at large. This will require small group discussions, presentations to large groups and publicity campaigns. A recent study of the political factors determining the success of Mexico's reform in 1988-1994 (Berensztein, 1998) emphasized several factors including the opportune use of an economic crisis and the formation of a coalition in support of the reform while preventing the formation of other coalitions to oppose it. But the late 1980s reform was revenue neutral while it pursued visible gains in efficiency. Currently, there is no apparent economic crisis, and the new tax reform, while pursuing gains in efficiency and equity, would have as its main goal a significant increase in the level of tax effort. In the past, Mexico's business elites appear to have been successful in blocking any permanent increases in the overall level of tax effort.[40] What may change now to make a revenue-increasing reform feasible? Perhaps the answer is to make the benefits of increased government services clear to decisive majority coalitions. The political strategy needs to capitalize on the growing national consensus on the need to increase public services.

To be successful, the tax reform package will also need to be comprehensive, covering all aspects of the tax system, including policy and administration. A comprehensive reform may be the only politically viable way to address the difficult aspects of the current tax system involving privileges and special treatments. Taking a comprehensive approach also facilitates other desirable objectives of tax reform besides revenue adequacy.[41] Similarly, tax administration reform should accompany tax policy reform and a lot of care should be taken to ease problems for tax administration arising from tax policy.

Content of the Tax Reform

[40] See, for example, Tonell and Esquivel (1995).

[41] Fiscal systems are interconnected systems. It is incorrect, for example, to consider the progressivity or regressivity of single taxes. Getting rid of a certain degree of regressivity in indirect taxation may be quite costly in terms of administration costs or other objectives, but this regressivity can be simply redressed in some other areas of the tax system. What should matter is the performance of the entire tax system, not what happens with individual taxes.

There are some general objectives that should guide the tax policy reform together with the modernization programs for the SAT and customs. The general objectives of the comprehensive reform should include:

1. **Revenue adequacy:** Revenue adequacy should be of paramount importance in this reform because the share of the public sector in GDP is currently inadequate to provide the increased level of public services desired by government. How much to increase revenue effort is fundamentally a political question, but it would seem that Mexico would need to raise somewhere between 13 and 15 percent of GDP in tax revenues.
2. **Elastic revenues over time:** Taxes should be designed so that the government's share in GDP at least keeps pace with the growth of income in the entire economy. Elastic revenues are needed to keep government away from introducing ad hoc new tax measures to simply keep up with ordinary increases in the demand for public services.
3. **Simplicity:** The tax structure should be kept simple while an effort is made to eliminate current provisions that either are unenforceable (consolidated returns) at the present time by the tax administration or those that increase both administration and compliance cost for taxpayers (a VAT-like structure for excise taxes).
4. **Fair distribution of tax burdens:** The new tax structure should attempt to increase the progressivity of the tax system, bearing in mind that the most effective progressivity must take place from the expenditure side of the budget. The tax system should also increase its horizontal equity by eliminating special treatments and privileges and by significantly improving tax compliance.
5. **Reduction in distortions:** The tax reform should strive to increase the efficiency of the tax system by minimizing current distortions and providing for a more level playing field. This will mean getting rid of special regimes under the CIT and eliminating special treatment for certain sources of income under the PIT and certain forms of consumption under the VAT.
6. **The modernization of tax administration:** The rationalization of taxes and tax administration should have the goal of increasing the public's confidence in the tax system and its perception of fairness. Taxpayers have a harder time complying with a system that seems unreasonable or capricious and that they believe is unfair. This may be the case if the system appears arbitrary in its enforcement by reaching only taxpayers subject to withholding.

In the pursuit of these goals, the major elements of the tax reform will include:

- Increasing the general rate of the VAT from 15 percent to allow enough increase in overall revenues after the revenue impact of all other measures is taken into account.
- Expanding the VAT tax base by eliminating all zero rating for domestic transactions– only exports will continue to be zero rated– and applying the general rate to all transactions including those in the north border zone. Basic food stuffs and medicines will be exempt but not zero rated. Small farmers will also be exempt by the general threshold exemption under the VAT.
- Expanding the base of the PIT by including in the tax base capital gains not previously taxed as enterprise profits
- Disallowing the deduction of fringe benefits at the enterprise level and keeping fringe benefits exempt at the individual level but discontinuing any credits and subsidies under the PIT
- Increasing the minimum exempt level from three minimum salaries to four or five under PIT to achieve a higher rate of progressivity .
- Eliminating the cash flow regime for agriculture and transport in the CIT
- Eliminating the reduced rate regime under the CIT, possibly keeping only the reduce (half) rate for agriculture
- Keeping the small enterprise regime but reducing the threshold from 20 to 10 million pesos.
- Offsetting the impact on the lower income groups by raising the zero rate from three to XXX minimum salaries.
- Introducing one single-stage taxation for excises at the level of imports or ex-factory and eliminating the multiple stage taxation with credits now in place.
- Introducing a petroleum product excise with a specific rate (ad rem) indexed for inflation. Doing the same for electricity, gas and phone services.
- Increasing all existing excise rates by 25 percent.

Revenue Impact of the Reform Package

The lack of appropriate data and sufficient time makes it impossible to derive the revenue impacts of the proposed reform. However a rough approximation of the most significant revenue implications is possible by using previous estimations of the tax expenditures connected with the reform proposals above:

- Taxing fringe benefits by disallowing their deduction at the enterprise level could bring additional revenues of up to 0.82 percent of GDP.[42] Note that this figure is understated because it does not include the actual costs of the subsidy and negative income tax associated with the current exemption of fringe benefits. If these are included, a conservative estimate of the revenue implications of taxing fringe benefits may be around 1 percent of GDP.[43] However, the final figure may be lower than that because only enterprises in a profit position will effectively pay taxes on fringe benefits paid to their employees.
- Eliminating the special cash flow regime for agriculture and transport sectors would yield 0.72 percent of GDP.[44] The elimination of the special rate (half) regime could bring the increase in collections to close to 1 percent of GDP.
- The elimination of zero rating for domestic transactions and its substitution with the exemption of basic food, medicines, and small primary sector producers could produce an increase in collections of around 1.4 percent of GDP in 1996. In addition, the credits paid out because of zero rating can cost in revenues as much as 1.1 percent of GDP.[45]
- The revenue impact of changes in the VAT rate can be approximated by the current revenue efficiency of the VAT.[46] For 1999, the efficiency was 0.218 which means that to increase revenues by 1 percent of GDP, the VAT rate would have to increase by approximately 4.5 percentage points, or a general VAT rate of 19.5 percent. This is an underestimate if the elimination of zero rating and other reforms are introduced. In this case the revenue efficiency of the VAT should increase significantly.
- Most of the other reforms proposed should have a minor revenue impact.
- If the entire proposed package were adopted in the forthcoming tax reform, Mexico's overall tax effort could increase to the desirable ranges discussed in this report of 15 or 16 percent of GDP.

APPENDIX 1

Methodology for Estimating Marginal Effective Tax Rates on Investment

1. The concept

The effective tax rate on capital calculated in our study is an effective *corporate* tax rate on capital, which combines all the taxes that would affect the capital investment at the

[42] See World Bank (1989).
[43] According to the information provided by the SHCP about 20 percent of PIT revenues were rebated as negative income taxes to the lowest groups in the income scale in 1994.
[44] See the World Bank (1989).
[45] See Casanegra et al. (1997).
[46] The revenue efficiency is defined as the ratio between VAT revenues in GDP and the general VAT rate.

corporate level in stead of personal level. Personal income taxes, however, may be incorporated into our calculation when they affect the capital investment at the corporate level. For example, the withholding tax on dividends certainly affects the cost of capital invested at the corporate level through its impact on the rate of return to equity required by shareholders.

The marginal effective tax rate measures the impact of a tax system on an incremental unit of capital investment. It incorporates the effects of not only statutory tax rates and related tax treatments (e.g. tax depreciation, tax credit, tax deductibility, tax holidays, etc.) but also various economic factors interacting with these tax treatments (e.g. financial costs, the inflation rate, and the structure of investment, etc). In other words, the effective tax rate is a summary indicator of the overall tax burden imposed by a tax system on an investment within a certain economic environment.

We calculate effective tax rates based on the assumption of profit-maximization. Profit-maximizing firms base their investment decisions on the present value of foreseeable incremental net revenues. Taxes reduce the portion of the profits accruing to the investor, while tax allowances mitigate such a reduction in accrued profits. Owing to the interaction between these statutory tax provisions and actual economic/industrial conditions (e.g., financing conditions, capital structure, input structure of production, etc.), effective tax rates can vary by industry even under the same tax regime. Furthermore, for a cross-jurisdiction comparison, differences in effective tax rates may reflect not only national variations in tax regimes but also different economic and financial climates in the various countries.

For profit-maximizing firms, the gross rate of return on capital (net of economic depreciation) must be equal to the financing cost of capital, adjusted for taxes. The size of this adjustment for taxes on a new investment is the effective tax rate on capital. For example, if the gross-of-tax rate of return to capital is 20 per cent and the net-of-tax rate of return is 10 per cent, then the effective tax rate on capital is 50 per cent.
It should be noted that the analysis of effective tax rates in this study deals only with 'profitable' firms. By 'profitable' we mean those firms that have taxable income and are not in a loss-carry-over position. Calculating METR for "tax-loss" firms would require data on average number of years for these firms to written off their losses and become taxable, which is beyond our policy concern at the current stage.

2. Methodology

The standard method used to estimate effective tax rates has been extensively documented[47]. The formula based on this method has been modified by incorporating some miscellaneous taxes such as capital tax, property tax, and tax on transfer of property[48]. The following are general formulas used in this study.

[47] Boadway, Bruce, and Mintz (1984).

[48] Chen and Mintz (1993).

i) Effective tax rate (*t)*

The effective tax rate on a given type of capital is defined as the proportional difference between the gross-of-tax rate of return required by a firm (r^G) and the net-of-tax rate of return required by an investor (r^N). r^G is the difference between the marginal revenue product (or user cost, in equilibrium) and economic depreciation. The after-tax rate of return is the weighted average of the return to debt and equity securities held by the investor. Thus, the effective tax rate (t) is defined as

$$t = (r^G - r^N)/r^G \qquad (1)$$

(ii) The real cost of financing (r^f)

For domestic investors, the real cost of financing (r^f) is defined by

$$r^f = ßi(1 - U) + (1 - ß)\rho - \pi \qquad (2)$$

with $ß$ = debt to assets ratio, i = cost of debt, U = the statutory corporate income tax rate, ρ = cost of equity, and π = inflation rate. That is, the cost of financing for an investor is the weighted-average cost of financing net of inflation rate.

For foreign investors, the real cost of financing (r^f) is defined by

$$r^f = [ß'i'(1 - U') + (1 - ß')\rho']*(1 - \gamma)/(1-x) + \gamma*[i(1-U) - \pi + \pi'] - \pi' \qquad (2')$$

with $ß'$ = debt to assets ratio in home country, i' = cost of debt in home country, U' = the statutory corporate income tax rate in home country, ρ' = cost of equity in home country, γ = the ratio of debt raised in host country to total investment fund, x = weighted average withholding tax rate in host country, i = cost of debt in host country, U = statutory corporate income tax rate in host country, π' = inflation rate in home country, and π = inflation rate in host country.

As the formula states, the cost of financing to a foreign investor is the weighted-average of costs of its investment fund taken from home country and the debt raised in host country. The former is the weighted average cost of financing at home net of withholding tax payable in host country, and the latter is the cost of debt in host country adjusted by income tax deductibility and difference in inflation rate between home and host countries.

(iii) The net-of-tax rate of return on capital (r^N)

For domestic investors, the net-of-tax rate of return on capital is defined by the formula

$$r^N = ßi + (1 - ß)\rho - \pi \qquad (3)$$

This is the rate of return on capital required by supplier of investment funds.

For foreign investors, the formula is

$$r^N = [ß'i'(1-U') + (1 - ß')\rho' - \pi'](1-\gamma) + \gamma(i-\pi) \qquad (3')$$

This is the net-of-tax rate of return on capital required by fund suppliers including foreign investors themselves and the creditors in host countries.

Applying (3) and (3') to equation (1), respectively, results in the effective corporate tax rate on capital for domestic investors and that for foreign investors.

(iv) The gross-of-tax rate of return (r^G) on capital

For domestic investors

$$r^G = (1+tm)(r^f + \delta)(1- k)[1 - A + \tau(1-U)/(\alpha + r^f + \pi)]/[(1-U)(1- tp - tg)] - \delta \qquad (5)$$

with *tm* = tax on transfer of property, or transaction tax (e.g., import duty) on capital goods where is applicable, δ = economic depreciation rate, *k* = investment tax credit rate, *A* = present tax value of the accumulated capital cost allowance, τ = capital tax rate, α = tax depreciation rate, *tp* = property tax rate, and *tg* = gross receipts tax rate, or presumptive tax.

For foreign investors

$$r^{G'} = (1+tm)(r^{f'} + \delta)(1- k)[1 - A + \tau(1-U)/(\alpha + r^{f'} + \pi)]/[(1-U)(1- tp - tg)] - \delta \qquad (5')$$

B. Inventory

For domestic investors

$$r^G = (1+tm)(r^f + U\pi\zeta)/[(1-U)(1-tg)] + \tau \qquad (6)$$

with *tm* = sales tax on inventory where it is applicable, and ζ = 1 for FIFO accounting method and 0 for LIFO.

For foreign investors, the formula is the same except that the financing cost should be the one relevant to the foreign investors. That is, r^f should be replaced by $r^{f'}$.

C. Land

For domestic investors

$$r^G = r^f (1+tm) [1 + \pi(1-U)/(r^f + \pi)]/[(1-U)(1- tp -tg)] \quad (7)$$

For foreign investors, the formula is the same except that the financing cost should be the one relevant to the foreign investors, i.e., r^f should be replaced by $r^{f'}$.

v) Aggregation

The effective tax rate for a given industry is the proportional difference between the weighted average of before-tax rate of return by asset type and the after-tax rate of return which is the same across asset type within the industry. That is, the marginal effective tax rate for industry *i* (t_i) is calculated as following:

$$t_i = (\Sigma_j r^G_{ij} w_{ij} - r^N_i)/\Sigma_j r^G_{ij} w_{ij} \quad (8)$$

where *j* denotes asset type (i.e. investments in buildings, machinery, inventories, and land), w_{ij} denotes the weight of asset type j in industry *i*.

Table 1
General Government Revenues as a Percentage of GDP

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total Revenues	**17.41**	**17.43**	**17.88**	**19.78**	**18.52**	**18.71**	**17.76**	**18.98**	**18.32**	**19.20**	**18.98**	**21.89**	**22.29**	**19.35**	**19.50**	**18.91**	**18.91**	**19.08**	**17.04**	**16.48**
Total Federal Revenues	15.30	15.27	15.63	17.79	16.88	16.86	16.00	17.06	16.34	16.43	15.93	18.69	18.70	15.51	15.52	15.25	15.68	15.84	14.17	14.52
Tax Revenues	10.91	10.64	9.98	10.41	10.46	10.37	11.53	10.92	11.53	11.30	10.90	10.71	11.26	11.40	11.29	9.27	9.03	9.82	10.51	11.21
Income Taxes	5.52	5.53	4.74	4.06	4.12	4.06	4.25	3.96	4.68	4.72	4.46	4.53	5.15	5.51	5.13	4.01	3.88	4.25	4.41	4.62
Value Added Tax	2.68	2.59	2.21	3.03	3.20	3.12	3.15	3.24	3.37	3.10	3.60	3.43	2.71	2.64	2.71	2.82	2.88	3.07	3.12	3.27
Excises	1.07	1.02	1.81	2.39	2.24	2.16	2.76	2.51	2.62	2.30	1.52	1.34	1.62	1.54	1.97	1.35	1.19	1.43	1.99	2.29
Import Taxes	0.99	1.09	0.84	0.52	0.52	0.69	0.87	0.81	0.44	0.73	0.86	1.04	1.14	1.01	0.89	0.61	0.59	0.57	0.56	0.60
Others[1]	0.65	0.40	0.37	0.40	0.38	0.34	0.49	0.39	0.43	0.45	0.45	0.37	0.65	0.70	0.58	0.49	0.49	0.50	0.44	0.44
Non-Tax Revenues[2]	4.38	4.63	5.66	7.38	6.42	6.49	4.47	6.14	4.81	5.13	5.03	7.98	7.44	4.11	4.23	5.98	6.65	6.02	3.66	3.31
Products, Services	0.18	0.34	0.24	0.28	0.15	0.06	0.05	0.07	0.08	0.08	0.26	0.26	0.34	0.14	0.24	0.48	0.29	0.27	0.31	0.17
Others[3]	0.16	0.17	0.46	0.24	0.10	0.20	0.24	0.35	0.93	1.38	0.75	4.01	3.65	0.81	1.49	1.28	1.57	1.39	0.61	0.68
Duties[4]	4.04	4.13	4.96	6.86	6.17	6.23	4.18	5.72	3.80	3.66	4.02	3.70	3.45	3.17	2.49	4.22	4.79	4.37	2.75	2.46
Of Which:																				
Hydrocarbon Duties	3.66	3.82	4.67	6.49	5.75	5.73	3.69	5.21	3.21	3.23	3.51	3.27	3.04	2.78	2.19	3.93	4.51	4.08	2.32	2.11
Other Duties	0.38	0.31	0.29	0.37	0.42	0.50	0.49	0.51	0.58	0.43	0.51	0.44	0.40	0.39	0.31	0.28	0.29	0.29	0.42	0.36
Social Security	2.94	2.92	3.20	2.67	2.41	2.58	2.50	2.29	2.36	2.42	2.57	2.74	2.90	3.24	3.44	3.10	2.94	3.06	3.28	3.41
Contributions[5]	2.45	2.41	2.47	1.99	1.96	2.17	2.14	2.11	2.14	2.20	2.32	2.39	2.72	2.98	3.15	2.68	2.54	2.70	2.88	2.97
Non-Tax Revenues	0.49	0.51	0.73	0.68	0.45	0.41	0.36	0.18	0.21	0.22	0.24	0.35	0.18	0.26	0.29	0.42	0.40	0.36	0.39	0.44
Subnational [6]	..	..	..	..	..	..	..	..	..	0.71	0.88	0.88	1.16	1.17	1.19	1.11	0.89	1.07	0.96	..
Taxes	..	..	..	..	..	..	..	..	..	0.20	0.27	0.33	0.40	0.42	0.40	0.36	0.35	0.41	0.37	..
Non-Tax Revenues[7]	..	..	..	..	..	..	..	..	..	0.52	0.61	0.55	0.76	0.76	0.78	0.76	0.55	0.66	0.59	..
GDP (Billion Pesos)	4.5	6.1	9.8	17.9	29.5	47.4	79.2	193.3	416.3	548.9	738.9	949.1	1125	1256	1420	1837	2504	3179	3847	4623

Source: Secretariat of Finance, Bank of Mexico, and authors' calculations. Total federal revenues include compensated operations, which are revenues for social security institutions and expenditures for the Federal Government. Compensated operations are excluded from the calculations presented in this table.

[1] Includes export taxes, some payroll taxes, accessories revenues, etc. After 1992, data for accessories revenues are reported in other tax revenues. Prior to 1992, the data series was reported separately. For consistency, prior to 1992, the data for accessories is added to other revenues.
[2] In 1988 includes revenues from zero-coupon bonds. In 1991,1992 and 1994 includes revenues from the sale of public enterprises
[3] Includes revenues from penalties, surcharges, privatization proceeds, etc.
[4] Prior to 1991, revenues from PEMEX were reported as a separate revenue line item. Prior to 1991, the data in this table are the reported data for revenues from PEMEX.
[5] For 1977 to 1991, the data series did not contain sufficient detail to identify the social security contributions of the Federal Government and these contributions are included as others of social security. From 1992, the contributions of the Federal Government are identified and are classified as social security contributions.
[6] Subnational revenue data is only available from 1989-1998.
[7] Non-tax revenues include fees, public services (including Productos and Aprovechamientos), and other revenues.

Table 2
General Government Revenues as Percentage of GDP

	General Government Total Revenues				General Government Tax Revenues			
	1980	1985	1990	1997[1]	1980	1985	1990	1997[2]
Mexico[3]	18.48	19.29	19.34	19.05	16.69	17.81	16.92	16.50
Argentina	18.77	18.72	16.68	20.88	16.26	16.26	15.15	18.99
Brazil	29.90	33.80	41.88	42.33	24.24	22.01	27.53	29.29
Chile [4]	33.60	30.09	..	24.63	26.27	22.23	..	20.44
Costa Rica	18.60	21.48	23.80	27.72	17.20	19.18	20.15	24.05
Dominican Rep.	14.64	11.17	12.23	15.35	11.16	10.17	10.89	13.91
Panama	25.96	26.20	26.34	26.67	19.02	19.04	18.27	18.47
Paraguay	11.25	10.16	12.44	14.40	10.06	8.42	9.24	9.27
Peru [5]	17.07	14.99	10.55	16.91	15.77	13.14	9.50	14.29
Canada	38.99	40.22	45.37	45.02	32.44	33.53	36.83	36.96
United States	31.81	32.53	33.51	36.71	26.84	26.30	27.18	29.22

Source: 1999 Government Finance Statistics, International Monetary Fund, 2000 World Development Indicators, The World Bank, and authors' calculations.

[1] The reported data for Brazil and Panama are for 1994. For Costa Rica and the Dominican Republic, the reported data are for 1996. For Paraguay, the reported data are for 1993.
[2] The reported data for Brazil and Panama are for 1994. For Costa Rica and the Dominican Republic, the reported data are for 1996. For Paraguay, the reported data are for 1993.
[3] General government revenues include federal government compensated operations, which are revenues for social security institutions and expenditures for the Federal Government. The reported data include compensated operations.
[4] Subnational government data are not reported for 1989-1991.
[5] The reported data for 1980 and 1985 are for consolidated central government operations only. Data on subnational government operations are not reported prior to 1990

Table 3
Estimated Tax Effort Rankings and Indices (1990-1996) [1]

Country	Ranking	Index 1	Country	Ranking	Index 2	Country	Ranking	Index 3
Mexico	**21**	**82.725**	**Mexico**	**27**	**62.84**	**Mexico**	**27**	**70.09**
Hungary	1	216.894	Lesotho	1	235.28	Hungary	1	183.36
Lesotho	2	185.648	Hungary	2	184.41	Romania	2	180.01
Uruguay	3	175.467	Romania	3	169.70	Uruguay	3	174.38
Romania	4	167.857	Bulgaria	4	155.73	Lesotho	4	155.37
South Africa	5	154.631	Estonia	5	141.05	Bulgaria	5	141.85
Bulgaria	6	144.605	Uruguay	6	140.43	Chile	6	135.58
Estonia	7	136.331	Tunisia	7	127.98	Costa Rica	7	132.59
Tunisia	8	125.879	Costa Rica	8	121.43	South Africa	8	125.35
Costa Rica	9	114.532	South Africa	9	120.03	Tunisia	9	115.26
Chile	10	107.784	Sri Lanka	10	115.35	Estonia	10	113.35
South Korea	11	102.801	Zambia	11	106.69	Sri Lanka	11	106.52
Sri Lanka	12	94.276	Malaysia	12	101.94	Cameroon	12	103.69
Zambia	13	93.069	Mauritius	13	93.56	South Korea	13	102.30
Indonesia	14	90.951	Chile	14	92.69	Mauritius	14	90.20
Mauritius	15	89.469	Indonesia	15	91.22	Burkina Faso	15	88.06
Venezuela	16	88.949	Panama	16	87.26	Turkey	16	86.96
Thailand	17	88.924	Pakistan	17	85.40	Malaysia	17	85.95
Malaysia	18	84.768	Thailand	18	85.24	Pakistan	18	85.190
Turkey	19	83.764	South Korea	19	75.68	Indonesia	19	84.96
Argentina	20	82.769	Turkey	20	74.99	Zambia	20	84.25
Panama	22	81.096	Burkina Faso	21	74.13	Venezuela	21	83.52
Pakistan	23	77.936	Republic of Yemen	22	73.79	Bhutan	22	83.21
Peru	24	77.258	Cameroon	23	73.71	India	23	82.41
Dominican Republic	25	69.709	Dominican Republic	24	73.06	Thailand	24	80.92
Bolivia	26	63.063	Venezuela	25	72.55	Argentina	25	77.19
India	27	60.011	India	26	69.27	Argentina	26	76.45
Cameroon	28	57.98	Bolivia	28	59.74	Dominican Republic	28	64.34
Republic of Yemen	29	56.88	Peru	29	58.51	Republic of Yemen	29	62.97
Burkina Faso	30	54.325	Bhutan	30	56.35	Bolivia	30	54.10
Bahrain	31	32.862	Argentina	31	55.02	Peru	31	53.52
Bhutan	32	30.255	Bahrain	32	34.02	Bahrain	32	42.51

Source: Government Finance Statistics Yearbook (1999);International Monetary Fund, World Development Indicators CD-ROM (1999), World Bank; and authors' calculations.

[1] Index 1 is equal to the ratio of actual collections divided by predicted collections, where predicted collections are based upon the regression of the ratio of tax revenues to GDP on per capita GDP and the sum of imports and exports divided by GDP. Index 2 is calculated in the same method except that predicted collections are based upon the regression of the ratio of tax revenues to GDP on the share of fuel and mineral exports in GDP and the share of agriculture in GDP. Index 3 is calculated using the regression of tax collections to GDP on per capita GDP, the sum of exports and imports divided by GDP, and the share of agriculture in GDP.

Table 4
Composition of General Government Revenue[1]
(As percent of General Government Revenues)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
General Government[2]	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total Federal Revenues	87.86	87.60	87.43	89.97	91.15	90.13	90.08	89.88	89.17	85.60	83.94	85.39	83.91	80.16	79.56	80.64	82.93	83.02	83.19	88.11
Tax Revenues	62.68	61.03	55.80	52.65	56.49	55.41	64.90	57.53	62.94	58.87	57.44	48.93	50.54	58.91	57.88	49.02	47.74	51.46	61.68	68.03
Income Taxes	31.70	31.75	26.52	20.55	22.23	21.69	23.92	20.87	25.52	24.59	23.51	20.70	23.10	28.48	26.32	21.22	20.53	22.27	25.86	28.00
Value Added Tax	15.42	14.86	12.39	15.34	17.27	16.67	17.76	17.08	18.39	16.15	18.99	15.66	12.14	13.63	13.91	14.91	15.23	16.11	18.29	19.85
Excises	6.14	5.85	10.11	12.10	12.12	11.54	15.55	13.25	14.27	11.99	7.99	6.12	7.25	7.95	10.09	7.11	6.27	7.48	11.69	13.89
Import Taxes	5.69	6.26	4.71	2.63	2.82	3.69	4.89	4.26	2.38	3.80	4.55	4.77	5.14	5.22	4.59	3.21	3.14	2.98	3.28	3.63
Others[3]	3.73	2.31	2.07	2.03	2.05	1.82	2.77	2.07	2.37	2.34	2.39	1.68	2.91	3.62	2.97	2.58	2.57	2.61	2.56	2.65
Non-Tax Revenues[4]	25.17	26.57	31.63	37.32	34.65	34.72	25.17	32.35	26.23	26.73	26.50	36.46	33.37	21.26	21.69	31.62	35.19	31.56	21.51	20.08
Products, Services	1.05	1.94	1.33	1.44	0.80	0.33	0.27	0.38	0.42	0.44	1.37	1.20	1.52	0.73	1.24	2.53	1.51	1.39	1.83	1.02
Others[5]	0.91	0.95	2.56	1.21	0.52	1.09	1.36	1.82	5.09	7.21	3.95	18.34	16.38	4.16	7.66	6.77	8.32	7.27	3.56	4.12
Duties[6]	23.21	23.68	27.74	34.67	33.33	33.30	23.55	30.14	20.72	19.08	21.18	16.92	15.47	16.37	12.79	22.32	25.36	22.90	16.11	14.94
Of Which:																				
Hydrocarbon Duties	21.03	21.90	26.13	32.80	31.05	30.64	20.78	27.45	17.53	16.83	18.51	14.93	13.65	14.35	11.20	20.81	23.84	21.36	13.64	12.78
Other Duties	2.18	1.77	1.61	1.87	2.28	2.66	2.76	2.70	3.18	2.25	2.67	1.99	1.82	2.02	1.59	1.51	1.52	1.54	2.48	2.16
Social Security	16.87	16.77	17.90	13.48	13.01	13.79	14.05	12.08	12.86	12.59	13.52	12.54	13.02	16.72	17.65	16.40	15.58	16.06	19.24	20.70
Contributions[7]	14.08	13.85	13.81	10.06	10.59	11.60	12.02	11.11	11.69	11.46	12.24	10.93	12.20	15.39	16.13	14.17	13.45	14.17	16.92	18.04
Non-Tax Revenues	2.79	2.92	4.09	3.42	2.42	2.18	2.03	0.97	1.17	1.13	1.28	1.61	0.82	1.34	1.51	2.23	2.13	1.88	2.32	2.66
Subnational	..	..	..	..	..	..	..	..	..	3.71	4.64	4.02	5.20	6.07	6.08	5.89	4.71	5.62	5.63	..
Taxes	..	..	..	..	..	..	..	..	..	1.02	1.40	1.50	1.80	2.16	2.07	1.90	1.83	2.16	2.14	..
Non-Tax Revenues[8]	..	..	..	..	..	..	..	..	..	2.69	3.24	2.52	3.40	3.91	4.00	4.00	2.88	3.46	3.49	..

Source: Secretariat of Finance, Bank of Mexico, and authors' calculations. Total federal revenues include compensated operations, which are revenues for social security institutions and expenditures for the Federal Government.

[1] The reported data may not equal 100% due to the exclusion of compensated operations from the calculations.
[2] Data for 1980-1988 and 1999 do not reflect subnational government revenues.
[3] Includes export taxes, some payroll taxes, accessories revenues, etc. After 1992, data for accessories revenues are reported in other tax revenues. Prior to 1992, the data series was reported separately. For consistency, prior to 1992, the data for accessories is added to other revenues.
[4] In 1988 includes revenues from zero-coupon bonds. In 1991,1992 and 1994 includes revenues from the sale of public enterprises
[5] Includes revenues from penalties, surcharges, privatization proceeds, etc.
[6] Prior to 1991, data on hydrocarbon revenues were not reported and revenues from PEMEX were reported as a separate revenue line item. Prior to 1991, the data in this table are the reported data for revenues from PEMEX.
[7] For 1977 to 1991, the data series did not contain sufficient detail to identify the social security contributions of the Federal Government and these contributions are included as others of social security. From 1992, the contributions of the Federal Government are identified and are classified as social security contributions.
[8] Non-tax revenues include fees, public services (including Productos and Aprovechamientos), and other revenues.

Table 5
Composition of Federal Government Revenues [1]
(As percent of Federal Government Revenues)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Federal Government	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Tax Revenues	71.35	69.67	63.82	58.52	61.98	61.48	72.05	64.01	70.58	68.77	68.43	57.30	60.24	73.48	72.75	60.79	57.57	61.98	74.15	77.21
Income Taxes	36.08	36.24	30.33	22.84	24.39	24.06	26.56	23.22	28.62	28.72	28.01	24.24	27.53	35.53	33.08	26.31	24.75	26.83	31.09	31.78
Value Added Tax	17.55	16.97	14.17	17.05	18.95	18.50	19.71	19.00	20.62	18.87	22.63	18.34	14.47	17.00	17.49	18.49	18.37	19.41	21.99	22.53
Excises	6.99	6.68	11.56	13.45	13.30	12.80	17.27	14.74	16.01	14.00	9.52	7.17	8.64	9.92	12.68	8.82	7.56	9.01	14.05	15.76
Import Taxes	6.48	7.14	5.39	2.92	3.09	4.09	5.43	4.75	2.67	4.44	5.42	5.59	6.12	6.51	5.77	3.98	3.78	3.59	3.94	4.12
Others[2]	4.25	2.63	2.37	2.25	2.25	2.02	3.08	2.30	2.66	2.74	2.85	1.97	3.47	4.52	3.73	3.20	3.10	3.14	3.08	3.01
Non-Tax Revenues[3]	28.65	30.33	36.18	41.48	38.02	38.52	27.95	35.99	29.42	31.23	31.57	42.70	39.76	26.52	27.25	39.21	42.43	38.02	25.85	22.79
Products, Services	1.20	2.22	1.52	1.60	0.88	0.36	0.30	0.43	0.48	0.51	1.64	1.40	1.81	0.91	1.55	3.14	1.82	1.68	2.20	1.16
Others[4]	1.04	1.08	2.92	1.34	0.57	1.21	1.51	2.02	5.71	8.42	4.70	21.48	19.52	5.19	9.63	8.39	10.03	8.76	4.28	4.67
Duties[5]	26.42	27.03	31.73	38.54	36.57	36.95	26.14	33.54	23.23	22.29	25.23	19.82	18.43	20.42	16.08	27.67	30.58	27.59	19.37	16.95
Of Which:																				
Hydrocarbon Duties	23.94	25.00	29.89	36.46	34.07	33.99	23.07	30.54	19.66	19.66	22.05	17.48	16.27	17.89	14.08	25.80	28.74	25.73	16.39	14.50
Other Duties	2.48	2.03	1.85	2.08	2.50	2.95	3.07	3.00	3.57	2.63	3.18	2.34	2.16	2.53	1.99	1.87	1.83	1.86	2.98	2.45
	71.35	69.67	63.82	58.52	61.98	61.48	72.05	64.01	70.58	68.77	68.43	57.30	60.24	73.48	72.75	60.79	57.57	61.98	74.15	77.21
Total Federal Revenues (as of GDP)	15.30	15.27	15.63	17.79	16.88	16.86	16.00	17.06	16.34	16.43	15.93	18.69	18.70	15.51	15.52	15.25	15.68	15.84	14.17	14.52

Source: Secretariat of Finance, Bank of Mexico, and authors' calculations. Total federal revenues include compensated operations, which are revenues for social security institutions and expenditures for the Federal Government.

[1] The reported data may not equal 100% due to the exclusion of compensated operations from the calculations.
[2] Includes export taxes, some payroll taxes, accessories revenues, etc. After 1992, data for accessories revenues are reported in other tax revenues. Prior to 1992, the data series was reported separately. For consistency, prior to 1992, the data for accessories is added to other revenues.
[3] In 1988 includes revenues from zero-coupon bonds. In 1991,1992 and 1994 includes revenues from the sale of public enterprises
[4] Includes revenues from penalties, surcharges, privatization proceeds, etc.
[5] Prior to 1991, data on hydrocarbon revenues were not reported and revenues from PEMEX were reported as a separate revenue line item. Prior to 1991, the data in this table are the reported data for revenues from PEMEX.

Table 6
Government Revenues as Percentage of GDP [1]

	General Government Total Revenue		Central Government Total Revenue		Taxes on income, profit, and capital gains		Social security taxes		Domestic taxes on goods and services		Taxes on international trade		Non-tax revenue	
	1980	1997	1980	1997	1980	1997	1980	1997	1980	1997	1980	1997	1980	1997
Mexico[2]	18.48	19.05	15.06	17.93	5.15	4.25	2.18	3.06	7.58	6.96	1.05	0.57	1.12	2.51
Argentina[3]	18.77	20.88	15.62	12.26	..	1.67	2.60	3.35	2.60	4.99	1.34	0.93	5.21	1.06
Brazil	29.90	42.33	22.63	31.01	2.42	3.65	5.66	8.22	7.27	6.57	1.62	0.52	4.85	6.85
Chile	33.60	24.63	32.77	22.79	5.64	4.03	5.55	1.39	11.47	10.45	1.39	1.87	6.38	3.77
Costa Rica	18.60	27.72	17.80	26.73	2.44	2.85	5.14	7.26	5.41	10.68	3.36	2.25	1.04	3.24
Dominican Rep.	14.64	15.35	14.39	15.23	2.75	2.49	0.55	0.62	3.07	5.09	4.45	5.55	3.18	1.18
Panama	25.96	26.67	25.33	18.61	5.38	5.21	5.37	4.93	4.24	0.67	2.62	0.10	6.75	6.91
Paraguay	11.25	14.40	10.74	14.08	1.63	1.46	1.41	..	1.90	5.03	2.66	1.75	0.94	5.00
Peru	17.07	16.91	17.07	15.74	4.42	3.29	6.29	1.32	6.35	7.80	4.62	1.35	1.31	1.71
Canada	38.99	45.02	18.48	20.28	9.71	10.39	1.92	3.69	3.07	3.53	1.30	0.38	2.52	2.30
United States	31.81	36.71	20.16	21.43	11.40	11.76	5.69	6.84	0.89	0.72	0.28	0.24	1.66	1.48

Sources: Government Finance Statistics Yearbook, International Monetary Fund (1999) and Global Development Network database (2000), The World Bank.

[1] Actual data for Brazil is 1994, Canada 1995, Costa Rica and the Dominican Republic 1996, and Paraguay 1993.
[2] General government revenues include Federal Government compensated operations, which are revenues for social security institutions and expenditures for the Federal Government.
[3] Data for taxes on international trade is for 1981.

Table 7
Year-to-Year Buoyancy of Revenue Sources [1] [2]

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Total Revenues	1.00	1.05	1.16	0.87	1.02	0.90	1.06	0.96	1.17	0.96	1.56	1.11	-0.29	1.07	0.88	1.00	1.04	0.41	0.82	0.93
Total Federal Revenues	0.99	1.05	1.20	0.90	1.00	0.90	1.06	0.95	1.02	0.90	1.62	1.00	-0.70	1.01	0.93	1.09	1.04	0.42	1.13	1.00
Tax Revenues	0.92	0.87	1.07	1.01	0.98	1.20	0.95	1.06	0.93	0.88	0.93	1.30	1.11	0.92	0.24	0.91	1.35	1.35	1.35	1.02
Income Taxes	1.01	0.68	0.75	1.02	0.97	1.09	0.93	1.19	1.03	0.81	1.06	1.74	1.61	0.42	0.04	0.89	1.37	1.19	1.25	1.00
Value Added Tax	0.89	0.67	1.47	1.10	0.95	1.02	1.03	1.05	0.70	1.49	0.80	-0.39	0.77	1.23	1.15	1.07	1.27	1.07	1.26	0.98
Excises	0.85	2.07	1.42	0.88	0.92	1.44	0.91	1.05	0.54	-0.41	0.51	2.09	0.55	2.98	-0.48	0.60	1.76	2.70	1.75	1.16
Import Taxes	1.30	0.46	0.20	1.01	1.55	1.42	0.93	0.21	2.73	1.55	1.74	1.53	-0.14	0.02	-0.51	0.93	0.83	0.90	1.37	0.95
Others[3]	-0.53	0.83	1.12	0.89	0.78	1.65	0.77	1.12	1.12	1.03	0.16	4.15	1.71	-0.56	0.33	0.99	1.09	0.31	1.01	0.95
Non-Tax Revenues[4]	1.17	1.40	1.40	0.73	1.02	0.28	1.29	0.70	1.23	0.93	2.74	0.59	-4.31	1.23	2.29	1.34	0.58	-1.60	0.45	0.71
Products, Services	2.77	0.25	1.28	-0.32	-0.87	0.51	1.39	1.07	1.29	4.15	1.02	2.47	-6.67	5.22	3.44	-0.68	0.70	1.84	-2.33	0.89
Others[5]	1.12	2.74	-0.08	-0.82	2.34	1.31	1.32	1.93	2.36	-1.06	5.99	0.44	-11.0	5.78	0.40	1.64	0.47	-3.24	1.60	0.43
Duties[6]	1.07	1.37	1.48	0.80	1.02	0.23	1.29	0.48	0.87	1.31	0.67	0.58	0.23	-0.95	2.91	1.40	0.61	-1.43	0.41	0.50
Of Which:																				
Hydrocarbon Duties	1.13	1.40	1.49	0.77	0.99	0.15	1.31	0.39	1.02	1.28	0.71	0.58	0.16	-0.95	3.12	1.43	0.58	-1.93	0.47	0.74
Other Duties	0.36	0.86	1.37	1.25	1.33	0.97	1.04	1.15	-0.09	1.52	0.40	0.56	0.70	-0.92	0.68	1.03	1.10	2.83	0.07	0.85
Social Security	0.98	1.18	0.71	0.80	1.14	0.94	0.91	1.03	1.09	1.20	1.26	1.33	1.98	1.50	0.60	0.83	1.16	1.35	1.22	1.12
Contributions[7]	0.95	1.05	0.65	0.97	1.20	0.97	0.99	1.02	1.10	1.18	1.12	1.74	1.82	1.45	0.38	0.83	1.25	1.33	1.17	1.11
Non-Tax Revenues	1.15	1.71	0.87	0.18	0.81	0.76	0.26	1.18	1.03	1.38	2.42	-2.81	4.09	2.04	2.33	0.84	0.54	1.48	1.57	1.15
Subnational[8]	..	..	..	..	..	..	..	..	..	1.69	1.00	2.58	1.11	1.07	0.76	0.28	1.76	0.42	..	1.19
Taxes	..	..	..	..	..	..	..	..	..	1.99	1.82	2.15	1.38	0.73	0.53	0.88	1.72	0.37	..	1.29
Non-Tax Revenues	..	..	..	..	..	..	..	..	..	1.56	0.57	2.82	0.97	1.26	0.88	-0.05	1.78	0.45	..	1.14

Source: Secretariat of Finance, Bank of Mexico, and authors' calculations. Not adjusted for discretionary changes.

[1] The Year to Year Buoyancy of variable X at time t is given by ((X(t) – X(t-1))/((X(t) + X(t-1))/2) / ((GDP(t) – GDP(t-1))/((GDP(t) + GDP(t-1))/2).

[2] Total federal revenues include compensated operations, which are revenues for social security institutions and expenditures for the Federal Government. Compensated operations are excluded from the calculations presented in this table.

[3] Includes export taxes, some payroll taxes, accessories revenues, etc. After 1992, data for accessories revenues are reported in other tax revenues. Prior to 1992, the data series was reported separately. For consistency, prior to 1992, the data for accessories is added to other revenues.

[4] In 1988 includes revenues from zero-coupon bonds. In 1991,1992 and 1994 includes revenues from the sale of public enterprises

[5] Includes revenues from penalties, surcharges, privatization proceeds, etc.

[6] Prior to 1991, data on hydrocarbon revenues were not reported and revenues from PEMEX were reported as a separate revenue line item. Prior to 1991, the data in this table are the reported data for revenues from PEMEX.

[7] For 1977 to 1991, the data series did not contain sufficient detail to identify the social security contributions of the Federal Government and these contributions are included as others of social security. From 1992, the contributions of the Federal Government are identified and are classified as social security contributions.

[8] Subnational revenue data is only available from 1989-1998.

Table 8
Average Estimated Buoyancy of Revenue Sources (1980 –1999)[1]

Total Revenues[2]	0.99
Total Federal Revenues	0.99
Tax Revenues	1.00
Income Taxes	1.01
Value Added Tax	1.02
Excises	0.94
Import Taxes	0.98
Others[3]	1.05
Non-Tax Revenues	0.96
Products, Services	1.08
Others	1.34
Duties[4]	0.89
Of Which:	
Hydrocarbon Duties	0.88
Other Duties	1.01
Social Security	1.04
Contributions[5]	1.06
Non-Tax Revenues	0.91

Source: Secretariat of Finance, Banco de Mexico, and authors' calculations. Total Federal Revenues include compensated operations, which are revenues to social security institutions and expenditures for the Federal Government.

[1] The average estimated buoyancy is equal to the coefficient for the natural logarithm of GDP when the natural logarithm of the revenue source is regressed on a constant, the natural logarithm of GDP, and an autoregressive term of order 1.

[2] Total revenues include compensated operations that are those transactions that are considered revenues for social security institutions and are expenditures of the Federal Government.

[3] After 1992, revenue data for accessories are reported in other tax revenues. Prior to 1992, the data were reported separately. For consistency, prior to 1992, the data series for accessories is added to other tax revenues and is not reported as a separate item.

[4] Prior to 1991, data on hydrocarbon revenues were not reported and revenues from PEMEX were reported as a separate revenue line item. Prior to 1991, the data in this table are the reported data for revenues from PEMEX.

[5] For 1977 to 1991, the data series did not contain sufficient detail to identify the social security contributions of the Federal Government and these contributions were included in the non-tax revenue series for social security. From 1992, the contributions of the Federal Government are identified and as reported as social security contributions.

Table 9
Coefficient of Variation of Major Revenue Sources (Millions of Current Pesos)[1]

	1980-1999			1980-1989			1990-1999		
	Standard Deviation	Mean	Coefficient of Variation	Standard Deviation	Mean	Coefficient of Variation	Standard Deviation	Mean	Coefficient of Variation
Total Revenues	242090.10	210861.44	1.15	36738.77	25386.80	1.45	214315.50	396336.08	0.54
Total Federal Revenues	205056.19	176833.50	1.16	31855.61	22316.06	1.43	186269.53	331350.93	0.56
Tax Revenues	146618.83	119785.32	1.22	22117.53	15225.33	1.45	143521.58	224345.31	0.64
Income Taxes	61667.29	51308.32	1.20	9131.10	6130.99	1.49	58389.52	96485.65	0.61
Value Added Tax	43642.99	34867.22	1.25	6220.06	4327.08	1.44	43700.10	65407.36	0.67
Excises	27635.85	20224.81	1.37	4708.63	3296.87	1.43	30876.86	37152.74	0.83
Import Taxes	8344.24	7834.59	1.07	1274.02	884.54	1.44	6166.46	14784.65	0.42
Others[2]	6430.27	5550.38	1.16	862.48	585.85	1.47	5637.11	10514.92	0.54
Non-Tax Revenues[3]	63407.50	57048.18	1.11	9772.64	7090.74	1.38	53349.21	107005.62	0.50
Products, Services	3782.42	2936.75	1.29	155.19	114.12	1.36	3531.85	5759.38	0.61
Others[4]	16476.62	14515.79	1.14	2528.04	1257.20	2.01	13269.76	27774.38	0.48
Duties[5]	45722.75	39595.64	1.15	7256.40	5719.42	1.27	42550.57	73471.86	0.58
Of Which:									
Hydrocarbon Duties	41468.58	35451.53	1.17	6323.31	5052.58	1.25	39202.36	65850.49	0.60
Other Duties	4947.94	4144.11	1.19	959.21	666.84	1.44	4888.21	7621.37	0.64
Social Security	45920.01	35579.90	1.29	4623.01	3251.32	1.42	45909.59	67908.48	0.68
Contributions[6]	40170.59	31446.84	1.28	4229.80	2922.13	1.45	39757.10	59971.55	0.66
Non-Tax Revenues	5812.86	4133.06	1.41	395.58	329.19	1.20	6246.77	7936.93	0.79
Subnational[7]	11057.80	17720.48	0.62	..	..	..	10539.77	19254.46	0.55
Taxes	4375.77	6405.69	0.68	..	..	..	4194.51	6998.00	0.60
Non-Tax Revenues	6710.18	11314.79	0.59	..	..	..	6378.00	12256.46	0.52

Source: Secretariat of Finance, Banco de Mexico, and authors' calculations. Total federal revenues include compensated operations, which are revenues for social security institutions and expenditures for the Federal Government. Compensated operations are excluded from the calculations presented in this table.

[1] The coefficient of variation is determined by dividing the standard deviation of the series by its mean.
[2] Includes export taxes, some payroll taxes, accessories revenues, etc. After 1992, data for accessories revenues are reported in other tax revenues. Prior to 1992, the data series was reported separately. For consistency, prior to 1992, the data for accessories is added to other revenues.
[3] In 1988 includes revenues from zero-coupon bonds. In 1991,1992 and 1994 includes revenues from the sale of public enterprises
[4] Includes revenues from penalties, surcharges, privatization proceeds, etc.
[5] Prior to 1991, revenues from PEMEX were reported as a separate revenue line item. Prior to 1991, the data in this table are the reported data for revenues from PEMEX.
[6] For 1977 to 1991, the data series did not contain sufficient detail to identify the social security contributions of the Federal Government and these contributions are included as others of social security. From 1992, the contributions of the Federal Government are identified and are classified as social security contributions.
[7] Subnational revenue data is only available from 1989-1998.

Table 10

Domestic MERTs

Marginal Effective Corporate Tax Rate (%) on the Domestic Capital Investment

1. Mexico

	Cash-flow tax for agriculture/transportation	Gross-receipt tax for small firms	50 of CIT rate for agriculture
Agriculture	-37.7	3.1	9.3
manufacturing	22.1	19.4	22.1
Construction	21.9	10.1	21.9
Transportation	-7.0	15.7	19.4
Communications	14.1	14.0	14.1
Public Utility	18.5	17.6	18.5
Wholesale Trade	23.7	13.6	23.7
Retail Trade	25.0	12.5	25.0
Inter-sector dispersion	**12.8**	**3.0**	**2.8**

2. The United States: for large firms only

	The current scenario	Applying Mexico's tax rates and inflation-adjusting rule
Agriculture	18.3	20.1
manufacturing	19.3	20.0
Construction	20.9	22.1
Transportation	18.7	17.8
Communications	10.1	9.9
Public Utility	13.2	13.8
Wholesale Trade	18.2	21.1
Retail Trade	21.5	22.4
Inter-sector dispersion	**2.9**	**2.3**

Table 11
Tax Burden by Income Decile: Base Scenario
(as percent of income)

Income Decile (1996 mx pesos)	VAT	Gasoline	Other Excises	Import Duties	PIT (only wages)	CIT	Social Security	Total Burden
0-11206	7.14	1.82	1.03	2.25	-14.54	0.46	6.03	*4.20*
11207-15621	6.81	2.29	0.90	2.00	-8.71	1.01	7.25	*11.55*
15622-19906	6.85	2.31	0.92	1.94	-7.63	1.01	9.16	*14.54*
19907-24584	6.89	2.38	0.87	1.86	-6.54	1.10	9.11	*15.67*
24585-30339	7.05	2.46	1.08	1.83	-5.50	1.22	9.86	*17.99*
30340-37571	6.94	2.74	1.07	1.76	-4.37	1.30	10.61	*20.05*
37572-47299	7.26	2.57	1.04	1.69	-2.95	1.46	10.67	*21.74*
47300-63823	7.13	2.36	1.13	1.58	-0.64	1.94	9.59	*23.11*
63824-96688	7.17	2.22	1.10	1.47	1.93	2.40	7.63	*23.92*
Over 96689	6.93	1.75	0.84	1.28	7.54	5.70	3.04	*27.08*
Total[1\]	*7.07*	*2.00*	*0.91*	*1.46*	*4.23*	*5.29*	*6.24*	*27.20*

Source: Staff calculations
1\ Total expresses the total collected revenues by each tax as a percentage of total before-tax income of all the households in the economy.
Given that each scenario leads to a different estimated before-tax revenue there may be a divergence on totals between scenarios.

Table 12
Tax Burden by Income Decile: Alternative Scenario
(as percent of income)

Income Decile (1996 mx pesos)	VAT	Gasoline	Other Excises	Import Duties	PIT (only wages)	CIT	Social Security	Total Burden
0-11186	7.16	1.82	1.05	2.26	-14.46	4.41	5.95	*8.19*
11187-15591	6.83	2.30	0.89	2.01	-8.78	4.24	7.30	*14.78*
15592-19876	6.84	2.29	0.91	1.94	-7.64	4.13	9.06	*17.53*
19877-24529	6.96	2.42	0.89	1.88	-6.53	4.09	9.13	*18.83*
24530-30252	7.07	2.48	1.09	1.83	-5.47	4.05	9.82	*20.86*
30253-37402	6.98	2.72	1.07	1.76	-4.48	3.96	10.68	*22.70*
37403-47072	7.32	2.60	1.03	1.70	-2.96	3.98	10.62	*24.30*
47073-63469	7.12	2.38	1.15	1.59	-0.67	3.99	9.71	*25.27*
63470-96191	7.23	2.23	1.10	1.48	1.94	4.05	7.64	*25.67*
Over 96192	7.07	1.78	0.86	1.30	7.58	5.46	3.12	*27.17*
Total[1\]	*7.21*	*2.04*	*0.93*	*1.49*	*4.32*	*5.39*	*6.36*	*27.75*

Source: Staff calculations
1\ Total expresses the total collected revenues by each tax as a percentage of total before-tax income of all the households in the economy.
Given that each scenario leads to a different estimated before-tax revenue there may be a divergence on totals between scenarios.

Table 13 Income distribution of net (after-tax income).
(In Percentages)

Income Deciles	Total Net Income	Salaries & Wages	Fringe Benefits	Business Income	Income from Interest	Other Monetary Income	Income in-kind
I	1.89	1.61	0.12	1.58	0.02	1.71	2.86
II	3.01	2.58	0.37	3.11	0.37	2.90	3.98
III	3.90	3.94	0.70	3.49	0.30	3.45	4.65
IV	4.82	4.72	1.37	4.49	0.93	4.45	5.73
V	5.88	6.09	1.74	5.01	3.69	5.61	6.65
VI	7.14	7.74	3.99	6.14	0.79	5.79	7.87
VII	8.78	9.48	6.18	7.18	3.21	7.72	9.62
VIII	11.20	11.99	8.57	9.40	4.98	9.77	12.22
IX	15.74	17.22	19.81	12.70	11.11	14.57	15.89
X	37.65	34.64	57.15	46.89	74.60	44.02	30.53
Total	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*

Source: Bank Staff estimates.
Note: The income categories are based on the divisions made during the incidence study (see methodological annex). The business income category also includes income from leasing activities and interests from the non-financial sector. Income from Interest takes into account only interest from saving accounts, equity instruments, and fixed-term investments; other categories are included in other monetary income. The deciles are not exactly the same between the base and the alternative scenario because of the different underlying gross-up process. For the net income the estimations are made using the base scenario deciles in order to control for the same population.

Table 14. Income distribution of gross (pre-tax income). Base Scenario.
(In Percentages)

Income Deciles	Total Gross Income	Salaries & Wages	Fringe Benefits	Business Income	Income from Interest	Other Monetary Income	Income in-kind
I	1.61	1.11	0.13	1.37	0.02	1.71	2.86
II	2.69	2.04	0.38	2.73	0.40	2.90	3.98
III	3.55	3.35	0.74	3.07	0.29	3.45	4.65
IV	4.43	4.10	1.45	3.96	0.95	4.45	5.73
V	5.48	5.47	1.83	4.46	3.77	5.61	6.65
VI	6.74	7.17	4.19	5.48	0.84	5.79	7.87
VII	8.42	9.03	6.49	6.47	3.33	7.72	9.62
VIII	10.93	11.83	8.98	8.62	4.95	9.77	12.22
IX	15.63	17.48	19.99	11.89	10.95	14.57	15.89
X	40.52	38.42	55.82	51.94	74.48	44.02	30.53
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Bank Staff estimates**.**
Note: The income categories are based on the divisions made during the incidence study (see methodological annex). The business income category also includes income from leasing activities and interests from the non-financial sector. Income from Interest takes into account only interest from saving accounts, equity instruments, and fixed-term investments; other categories are included in other monetary income. The deciles are not exactly the same between the base and the alternative scenario because of the different underlying gross-up process. For the net income the estimations are made using the base scenario deciles in order to control for the same population.

Table 15. Income distribution of gross (before-tax income). Alternative Scenario. (In Percentages)

Income Deciles	Total Gross Income	Salaries & Wages	Fringe Benefits	Business Income	Income from Interest	Other Monetary Income	Income in-kind
I	1.63	1.09	0.13	1.55	0.02	1.69	2.84
II	2.74	2.05	0.38	2.93	0.38	2.92	3.97
III	3.60	3.31	0.74	3.39	0.30	3.44	4.68
IV	4.49	4.09	1.45	4.34	1.21	4.42	5.66
V	5.55	5.42	1.80	4.82	3.45	5.64	6.68
VI	6.85	7.21	4.22	5.81	1.42	5.81	7.87
VII	8.53	8.93	6.34	7.18	2.56	7.59	9.65
VIII	11.06	11.88	9.22	9.09	5.07	9.64	12.15
IX	15.80	17.47	19.60	12.36	11.04	14.57	16.00
X	39.75	38.56	56.14	48.54	74.55	44.29	30.52
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Bank Staff estimates.

Note: The income categories are based on the divisions made during the incidence study (see methodological annex). The business income category also includes income from leasing activities and interests from the non-financial sector. Income from Interest takes into account only interest from saving accounts, equity instruments, and fixed-term investments; other categories are included in other monetary income. The deciles are not exactly the same between the base and the alternative scenario because of the different underlying gross-up process. For the net income the estimations are made using the base scenario deciles in order to control for the same population.

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